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COMPUTER WEEKLY

ICL in negotiations on Nigerian local equity

NIGERIA will be the third developing country, after India and Mexico, where ICL admits local equity participation and negotiations are under way with the Nigerian government.

IBM has withdrawn from both Nigeria and India rather than have its equity diluted by local holdings.

Negotiations are still going on in India, where the government wants ICL to merge its two companies and reduce its holding to 40%.

Managing director Dr Chris Wilson declines to reveal the proportion ICL hopes to retain, but Burroughs has 60% of its Tata-Burroughs joint venture on peripherals in India, and ICL is probably hoping for something similar.

ICL regards the invitation to manufacture 100 2903s in India as important.

"The Indian economy is improving rapidly, and they now have a balance of trade surplus, so the machines we build there will give us a good base for future growth in India," he said.

ICL inherited its small Mexican subsidiary from Singer, and has acceded to government regulations by finding a local partner to take 51% of the equity. With an embryo oil industry, Mexico is keen to invest in computer technology, and ICL is now well placed to win a share of the business.

Overall, the Third World is one of the keys to ICL's long-term strategy. "It will be a very big marketplace in 20 years' time and we have to concern ourselves with it now," said Dr Wilson.

NEWS IN BRIEF

£1.9m grant for Indian 2960

THE first large ICL 2900 for India, exclusively revealed in Computer Weekly (March 16), is to be supported with a £1.9 million grant from the Ministry of Overseas Development. The 2960 is going to the Delhi Indian Institute of Technology, one of a chain of IITs in major regional centres, each of which is supported by a foreign government. The IITs are educational and research centres, and Imperial College, London, heads a group of UK universities assisting in 15 research and development projects at the Delhi IIT, which at present has an ICL 1909.

Wang profit up 71%

REVENUES of $198 million, a dramatic 47% increase over the previous year, have been reported by Wang Laboratories in the results for its 1978 financial year which ended on June 30. Net profits, at $15.6 million, are 71% up on fiscal 1977.

HP enhancement

AN enhanced processor, introduced by Infotex Systems for the Hewlett-Packard 9830 series of desk top calculators, is said to run programs at least eight times faster than a standard machine. Known as the FP-30, it is available in the UK through GSG Data Sales.

Telecom takeover

ADDING to its portfolio of acquisitions in the US computer and communications field, Northern Telecom of Montreal is to buy Eastern Data of Mooreatown, New Jersey. Eastern Data's main business is running its Spactron subsidiary which makes data transmission and control equipment.

BCS looks to grow as subs go up 30%

SUBSCRIPTIONS to the British Computer Society are to rise by 30% from May 1, 1979, but determined efforts are to be made by the Society's officials and members to find ways of increasing membership and, as the BCS Kingston branch secretary put it, "to make sure members get more for their money."

The subscriptions increase were ratified last week at the Society's annual meeting in London, with only two votes against. About 500 postal votes were received but these were not examined as no one at the meeting suggested that such a move should be made.

One official of a BCS branch had contacted Computer Weekly before the meeting saying he was concerned that the views of the proxy votes should be taken into account. But Derek Harding, the BCS secretary-general, commented that those who came to the meeting to hear the reasons for increasing the subscription had "virtually unanimously" accepted the recommendation.

And Harding issued an open invitation to any member who wished to examine in detail the way the society used members' money, either to attend meetings such as the agm or to contact him at BCS headquarters to discuss the matter in person.

Harding accepted, however, that in the long run it was important that the BCS recruited more members so that it could extend its activities in other ways than by just raising subscriptions.

A task force under Frank Hopper of Barclays Bank has been established by the BCS Council to look at ways of increasing membership and of making the benefits of membership more visible (CW October 12).

The BCS Kingston branch submitted a report to the BCS recently, suggesting ways of attracting more members. This will be considered by the task force.

Secretary of Kingston branch, David Allan, told Computer Weekly that he regretted the subscription increases but did not oppose them.

He commented that, in a survey conducted by the branch of 100 installations in the Kingston area, they had found too many people who were not aware of the BCS and many DP managers who did not have time to take exams.

"We want full membership with voting rights for such experienced staff, not just affiliate status as at present," Allan commented. "The only way membership status will mean anything is if we find an entry route to the Society without an exam."

Kingston branch is currently putting test cases to the BCS membership board to see if the experience route can be made acceptable.

A paper was recently submitted by Roger Griffiths to the membership board which discussed ways of bringing more experienced professionals into the society (CW, August 10).

Three-year freeze?

If inflation remains within single figures, the BCS hopes to keep subscriptions steady for three years at the new level to be introduced next May.

The new annual subscriptions range from £28 for fellows and £19 for full members, to £6 for students, £10 for associates and £14.80 for affiliates, the grade at which "experience" qualifications are currently accepted as opposed to the academic qualifications needed for full membership.

At the BCS annual meeting last week, which voted to accept the increases, four people were elected to the BCS Council: Alan Boyce, head of management services for W. H. Smith; Ros Fiddes, of the Central Computer Agency; John Ivenson, management consultant at Altergo; and Bob Parslow, lecturer at Brunel University.

Ten years of business by Sintrom was celebrated last week with a seminar at the Royal Lancaster Hotel in London. Managing director Tom Dalzell is seen here with the new Perex 8000 data logger, one of two new versions of the product introduced at the seminar.

Search for an office

DUE to expansion of its consultancy activities, Sales and Marketing Services is extending its London operations and is looking for a new office to accommodate about six people. Anyone who can offer such office space should contact Ann Williams at Whaelwright's House, Pipe Ridware, Rugely, Staffordshire. Tel: 088022 281.

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BP orders a Univac 1100/81 processor

A LARGE-SCALE Univac 1100/81 processor is on order to handle all BP's scientific computation, and is to be installed alongside Scicon's 1108s at Milton Keynes next February. Meanwhile the 1108s are being enhanced with add-on memory from Telefile Computer Products.

BP is already a large user of 1100 hardware, with an 1100/21, an 1110 and an 1108, but the 1100/81 is a much more powerful machine than any of these and a significant order for Univac's UK subsidiary.

Scicon, a wholly-owned subsidiary of BP, plans to continue operating its two 1108s for as long as possible, regarding future developments in the mainframe area as too uncertain for it to be possible to make the right choice of replacement at present.

It is therefore upgrading the 1108s with a specially-developed Telefile enhancement which enables main memory on the machine to be doubled from the 256K-words maximum offered by Univac (CW, March 23). Because of the memory demands of the Exec 8 operating system, now called OS/1100, doubling the main memory can give a threefold improvement in throughput.

● Constructors John Brown is replacing the Univac 1100/10 and ICL System 4/50 at its London headquarters with a 512K-word 1100/81.

Future of Fortran Forum

THE future shape of Fortran is to be discussed at an important meeting in London next month. It will be followed by a Fortran Forum at which anyone interested in the subject can discuss Fortran with the people most closely involved in developing Fortran 82.

On November 27 a meeting of representatives from around the world will be held under the auspices of the International Standards Organisation to discuss Fortran 82. The BCS Fortran specialist group has helped to co-ordinate British views to be input to this meeting (see articles by David Muxworthy, CW August 3 and 10).

On December 1, the chairman, secretary and other members of the most influential standards body on this subject, the American National Standards Institute Fortran Standards Committee, will give the British DP public a unique opportunity to learn at first hand about the future of Fortran when the ANSI committee members attend Fortran Forum 78 at Imperial College, London.

The fee for attending the Forum on December 1 is £10 for BCS members and £15 for non-members, including lunch and refreshments.

Bookings can be made in writing by contacting J. Roberts-Jones, secretary, BCS Fortran specialist group, Data Processing Division, City Treasury, PO Box 1, Liverpool, L69 2DQ.

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Briefing

Three leave Inmos

THREE of the five former Mostek employees who joined Inmos this year have left the British NEB-backed company to set up a consultancy operation, with Mostek believed to be one of their first clients. The three are Ward Parkinson, Dennis Wilson and Doug Pittman. A fourth ex-Mostek man, Inmos chief operating officer in Dallas, Texas, Dr Paul Schroeder, told Computer Weekly, "their departure should not make any significant impact on our plans although it is difficult to assess the full implications at this stage."

Recently, Mostek failed in an attempt to prevent its former employees from using Mostek trade "secrets" while working for Inmos (CW, September 28).

Times threat denied

SUGGESTIONS from some unions that The Times plans to get round union objections to computerisation by closing down, installing new equipment, and opening up again were described as "absolute nonsense" by a Times spokesman. The ultimatum presented to the unions to reach an agreement by November 30 involved much else apart from new technology, he said, including work practices and guarantees against lightning stoppages, adding that nobody would be made compulsorily redundant in their three-year changeover scheme.

Subsidiary plan 'no'

AFTER a review of its operations in the US and 21 other countries, IBM has decided against turning its General Business Group — which takes in office products and small computers — into a subsidiary. However it added that it intended to continue a policy of more self-sufficiency for its business units.

Trouble at HMSO

PUBLICATION of the Data Protection Committee's report is being delayed yet again, this time by industrial troubles at Her Majesty's Stationery Office where it is being printed. Home Secretary Merlyn Rees had promised publication before Parliament reopens on November 1. It is not now known when the report will appear.

Zilog price cuts

PRICE cuts of just over 50% have been announced by Zilog in the US for its Z80 and Z80A microprocessor chips. The Z80 falls to $12.85 and the Z80A to $15.45. Similar cuts have been made in prices for the Z80 family of peripheral chips and the MCZ range of development systems.

CBI debate

THE Confederation of British Industry is to debate how businesses should adapt to cope with technological change and rising unemployment at its second annual conference, to be held at the Dome, Brighton on November 6 and 7.

Guides for hardware/services users

USERS are being provided with two documents to assist in the selection of computer hardware and services.

The Computing Services Association has just published its long-awaited contract guidelines for computer services. The guidelines come in the form of a concise document that includes sections on consultancy, systems development, software product licences and turnkey systems as well as batch and remote access bureau services. The document costs £25.

And purchasers of hardware will soon be provided with a list of "model" conditions for computer-related contracts due to be published early next year by the Institute of Purchasing and Supply.

Edward Sambridge, chairman of the IPS working party drawing up the model conditions for hardware purchasing, told Computer Weekly that they should enable purchasers to avoid conflict with their suppliers by listing what conditions a purchaser could be reasonably be entitled to demand in relation to factors like site readiness, late delivery, facilities for testing and the supplier's access to his site.

Sambridge is purchasing and contracts officer at the Central Electricity Generating Board, and other members of the IPS working party include representatives from local government and private industry, including Kent County Council and GKN, the National Computing Centre and the Computing Services Association.

The IPS working party is also collaborating with organisations like the Central Computer Agency, the BCS and Lamsac, through the National Computer Users Forum. In addition, Sambridge will address the first Conference of European Computer User Associations in Brussels next month.

THE BIG SHOW

IF you want to visit the biggest UK computer show of 1978, book your ticket now! Compec, the leading European show for peripheral equipment, minis and small business systems, will be held at Olympia, London, from December 5 to 7, and already there has been an unprecedented demand for tickets. Applications for pre-registration can be received up to Wednesday, November 22, and this will ensure free entry to the exhibition. After that date tickets will be available at the door at £2 each.

With nearly 250 companies exhibiting products and services all space at Compec is completely sold out and it will be the most comprehensive show of computer hardware and software ever staged in the UK.

Make sure of your tickets. Book now!

DBMS power on IBM Pacific

MAJOR product launches from IBM, Amdahl and ICL have highlighted the increasing competitiveness of systems across the mainframe spectrum. As predicted (CW, October 12) IBM has introduced the System 3 successor, Amdahl has brought out its most powerful machine (see below) and ICL has announced a system to provide an upgrade path for its low-end users (Page 3).

The new IBM System 38, code-named Pacific, is an integrated database system for the small business market and is programmed in an RPG II superset called RPG III. It is a virtual system, with disc storage, ranging from one to six 64 Megabyte drives, all fixed and logically treated as an extension of main memory.

Simultaneous access to the database is offered at up to 40 terminals, which can be any mix of VDUs and printers, installed both locally and remotely. Much of the new Control Program Facility, CPF, operating system is contained in microcode, and there is no limit to the number of batch, transaction and spooling subsystems which can be established under CPF.

The database system is described as containing aspects of relational, hierarchical and network databases, and facilities

● Turn to page 18

DPinched

ELECTRONIC test equipment worth £11,000 was stolen from Livingstone Hire by someone who telephoned in an order, giving an account number belonging to the British Steel Corporation. The number and the corresponding stock levels were checked on Livingstone's computer, and the goods despatched by train to Sheffield, where an unknown person picked them up at the station.

Amdahl adds V/8 to range

ALREADY offering the most powerful general-purpose mainframe available outside Japan in the shape of the 470V/7, Amdahl Corp has added an even more powerful 470V/8 as a field-upgrade from the V/7. At the other end of the line, a V/5-II model has been added.

Key figures of the V/8 are a 26 nanosecond machine cycle, compared with the 29 nanoseconds of the V/7, and a 64K-byte buffer which incorporates data pre-fetch in addition to the usual instruction pre-fetch.

Data as well as instruction pre-fetch is a feature of the Univac 1100/80, which has a formidable 16K 30-bit word buffer, but has not hitherto been offered on IBM 370 or 370-compatible mainframes.

Data and instructions are dynamically intermixed in the buffer, which has twice the capacity of that on the V/7.

The V/8 has a minimum of 4 Megabytes main memory and 12 channels and a maximum of 16 Megabytes and 16 channels; prices range from £2 million to £2.75 million compared with £1.8 to £2.5 million for the V/7.

■ Turn to page 18

Esterson

ILEA staff inspector stresses DP

INCREASING emphasis is to be placed on computer education in Inner London, according to Derek Esterson, pictured above, who has just been made ILEA's staff inspector for science and engineering, having been inspector for computer education for the last five years. Practically all school subjects will contain some computer element.

"We will have to respond to this challenge and ensure that pupils are well equipped to make the most of computers," Esterson said. "Ideally, the potential of computers and their effect on society should be given more emphasis in the Bachelor of Education teacher training courses, but until this happens we will rely heavily on our in-service courses."

Esterson added that microprocessors will become an accepted classroom tool not only for engineering subjects but for those such as geography and the humanities where statistics have to be processed. By 1980 about 140 secondary schools will have a terminal.

GEC on brink of leap forward

THE moves that will take GEC from the smallest to largest manufacturer of semiconductors in the UK now seem to be coming to a head. Plans for the siting of the new GEC-Fairchild joint venture facility are likely to be announced in the first week of November, while GEC is pressing ahead with its offer for Plessey's semiconductor operation at a figure believed to be around £50 to £60 million.

On the subject of Plessey Semiconductors, GEC technical director Robert Clayton had no comment to make, but sources close to GEC suggested that such a merger between the two was considered "a highly desirable thing by many people in industry and government".

Plessey refused to comment on the speculation.

It is understood that Plessey needs new capital to continue either development of its magnetic bubble products, or to maintain its position in telecommunications. This latter area is already the subject of speculation that the National Enterprise Board is keen to see Plessey's efforts here merged with STC.

If Plessey Semiconductors does go to GEC one of the prize possessions would be the Allen Clark Research Establishment. This carries out a wide range of research projects in telecommunications and semiconductors, including charge-coupled devices. Both GEC and Fairchild work with CCD products.

COMPUTER WEEKLY'S INSIDE NEWS

DPM MICRO BLUES

The data processing manager is under attack from all sides, with the threat of an uncontrolled spread of micros in user departments and a lack of staff to keep the current system ticking over. The Institute of Data Processing Management, however, is offering at least a shoulder on which the DPM can sob away his micro blues.

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COMPUTER WEEKLY

Vol. 25 No. 624
Thursday, October 26, 1978

Editor
Malcolm Peltu 01-261 8033
Deputy Editor
Tony Higgins 01-261 8699
Advertisement Manager
Harry Hutson 01-261 8022
Class Ad Manager
Brian Durrant 01-261 8587

IPC Electrical-Electronic Press Ltd, Dorset House, Stamford Street, London, SE1 9LU. Telephone: 01-261 8000. Telegrams/Telex: 25137 BISPRS G

Branch Offices:
Birmingham: 202 Lynton House, Walsall Road, Birmingham 22B. Telephone 021-356 4835
Manchester: Statham House, Talbot Road, Stretford, Manchester M32. Telephone 061-872 4211.
New York: 205 East 42nd Street, New York, NY 10017. Tel (212) 867 2080. Telex 421710

Published weekly on Thursday.
Registered at the Post Office as a newspaper. Price per copy 18p

© IPC Business Press Ltd 1978.

Members of Computer Weekly staff may be contacted directly on the extensions listed below. Other departments in Dorset House may be obtained by dialling (01) 261 8000.

EDITORIAL

Keith Jones	261 8344
Tim Palmer	261 8031
Peter Hawkins	261 8303
Rory Johnston	261 8028
Martin Banks	261 8605
Rebis Webster	261 8170
Bernard Allen	261 8035
Donald Kennett	261 8719
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Nanette Gibbs	261 8174
Manchester	
Owen Kelly	061-872 4211
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Basil McGowan	021-356 4658
Production	
Ian Carter	261 8018
Ken Welford	261 8878
Roger Albury	261 8618

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Controlled Circulation Department: IPC Business Press (Sales & Distribution) Ltd, 40 Bowling Green Lane, London EC1R 0NE. Tel: 01-837 3636.

Subscriptions for readers outside the above categories: One year, UK £14.50; overseas £20; USA, Canada $52. Students £7.30; overseas £10; USA, Canada $26. Airmail rates on request. Subscriptions: IPC Business Press (Sales & Distribution) Ltd, Oakfield House, Perrymount Road, Haywards Heath, Sussex RH16 3DH. Tel: 0444 59188.

Back numbers can be had as available for 40p post free.

Computer Weekly has a circulation each week of over 82,000 including the highest fully requested circulation in the UK. The international edition, which is published 16 times a year, has a circulation of over 94,000.

ISSN 0010-4787

COMPUTERVIEW

Naught for the comfort of the poor old DPM

"THE Data Processing Manager has enough on his plate worrying about getting his current systems up and running. So when is he going to find time to bother about all these new-fangled micros?"

That was the heart-rending view expressed at the end of a meeting last week in which the poor old DPM was hammered from all sides (see page 3 and 15).

Organised by the Institute of Data Processing Management and Computer Weekly, the aim of the meeting was to examine the impact of the micro on DP.

The micro enthusiasts depicted the DPMs as a group of mainframe-bound reactionaries, unaware of the wonders of the greatest inventions since bit-sliced breadboards.

Even Conway Berners-Lee, of ICL, had nought for the comfort of the DPM, even though he provided a counter-balance to some of the excesses of the pro-micro brigade.

He pointed out that, as systems became more distributed, there would be an increasing need for disciplined central system design and co-ordination.

He said that too many small systems spread around an organisation could mean the proliferation of unco-ordinated and incompatible databases which would be difficult, if not impossible, to knit together into a coherent system.

Wise words, but ones which bring no solace to the DPM, because they do not say what he can do to cope with the ever-changing computer world.

Ron Yearsley, of BIS Applied Systems, has given one solution to the DPM (CW, October 19), which is to insist that an edict is issued saying that no computer system over £3,000 is purchased without his consent.

That might solve the problem of the unco-ordinated growth of micro-based systems, but it merely adds an extra load to the already overburdening problems facing the DPM.

The most important problems are, of course, how to keep the current workload maintained and running and then how to develop new systems. Yet the incredible shortage of DP staff makes even these basic tasks difficult to handle.

How, then, is the DPM going to hope to do something about, say, word processing, in addition to the existing workload?

The problem becomes more urgent daily, because there are more and more salesmen of micros, small systems and word processors out to capture the heart of the disillusioned "end user."

As Yearsley said, solutions will only be found if the DPM becomes an active agent of change, rather than a passive technician hooked to the past.

That type of action can only be taken on the individual initiative of the DPM. But it should be backed by assistance from the organisations that exist to represent the DP world — support like the vigorous efforts being made by the Computing Services Association and the National Computing Centre to set up a variety of activities to stimulate the kind of training and education that will help solve some of the staff shortage problems which are currently the bane of the DPM's life.

By organising last week's meeting and agreeing to set up a focal point for an ongoing look at the impact of the micro on DP, the IDPM is also offering at least a helping hand to the DPM.

And if the British Computer Society is to succeed in its drive to increase membership (CW, October 19) it will have to take some initiatives in helping the practical DPM to sort out his tangled technological web.

FOCUS

Computing codes of conduct

ACCORDING to Computer Weekly (October 12) a recent Code of Conduct computing conference, held in the States, included lawyers, philosophers and computer people. Not surprisingly, no attempt was made to get the participants to agree on any specific code of conduct.

Few areas of computing appear to generate so much discussion outside the everyday working confines of the installation. Seldom are DPMs confronted with troubled shift leaders politely suggesting that ethical obligations forbid the completion of the job run.

A confrontation is more likely to be on the lines of: "Either the faulty drive goes or I will". Similar sentiments are expressed in connection with the new temporary operator; likewise in respect of the draught from the air conditioning channel above the op control panel.

On their part, senior analysts seldom express concern in social legalities of new application projects. More likely their concern agenda will include:

1. The impossibility of achieving implementation time-scales without a hefty injection of time and personnel resources;

2. The establishment of a user department liaison and translation unit; or,

3. The provision of a new coffee machine adjacent to the systems office.

Following the conference, a report is being issued entitled "Ethical Conflicts in Computer Science and Technology". For most DP managers the conflicts are eminently practical. Will Storage Technology engineers interface smoothly with those of the IBM service team? Will ICL sales object if BASF disc packs are introduced? Will the computer room floor take the strain of the new line printer?

Seldom does the DPM have time or inclination to get involved in social implications of computing. No amount of professional conduct guidelines from the sundry industry bodies will amend and deflect company objectives.

Conflicts for UK DP teams are more likely to involve run compiles, head crashes, JCL errors and late delivery of stationery. Few in the operations team are concerned with the result of their activities, except to see it gets to the relevant dispatch zone on time. For the op team, ethics stop at the job run number.

Only analysts, being closer to the end results, are in any position to evaluate social responsibility and there are few projects — outside State run installations such as the police, health and employment, in this category.

Leaving well alone, however, is not possible. Although certain aspects of ethics such as fraud and breach of contract are covered by law, as Computerview pointed out, ethical judgments are required in the case of breach of confidence or unachieved promises which could bring the profession or organisation into disrepute. Let's hope that Swansea took note.

Before long, remaining areas of ethics could well be the subject of Law. The Data Protection Committee is rumoured to be about to stir and publicise its long-awaited report.

Already a Privacy Conference and Workshop has been arranged for January under the influential might of the IDPM, NCC and NCCL. Codes of conduct will be on the agenda plus no doubt a hefty dose of ethical conflict.

SEMINAR

PRESCRIPTION PRICING AUTHORITY EXPERIMENTAL COMPUTER PROJECT

A seminar is to be held on 7.11.78 at the Pricing Authority's Headquarters in Newcastle upon Tyne, for Manufacturers' representatives to discuss with Project staff the hardware requirements for practical trials of data collection methods and equipment which are to be conducted in 1979.

For further information ring 0632 25371 Ext. 30.

Ten years ago...

COMPUTER WEEKLY — OCTOBER 24, 1968

PROVISION of multi-access graphic display facilities for every design team in its divisional engineering departments was the five-year target of chemical giant ICI . . . The Prime Minister, Harold Wilson, saw an ICL System 4/70 in operation when he opened the National Giro Centre at Bootle . . . Fears that the Russian invasion of Czechoslovakia and the consequent souring of relations between East and West would cause a cutback in the sales of computers to the East were proved to be unfounded . . . Orders received by IBM Australia during the past two weeks had given it a large share of the insurance market there . . . The Ministry of Technology's CAD centre at Cambridge was to be managed by ICL, according to a Mintech spokesman . . . Universities were giving inadequate attention to training in management sciences at the undergraduate level, according to Dr M. G. Kendall, chairman of Scientific Control Systems.

Digital adds to DECstation range

OFFERED on an OEM basis and also to end-users is a line of systems added by Digital Equipment to its DECstation series of small business computers. The new machines are the entry level 78/50, which is based on the VT 78 video processor, and five systems configured around the PDP-8A processor — the 88, 50, 70, 80, 90 and 97.

DEC has also announced the second member of its L System line for low-cost packaged systems — the PDP-11V03-L, which is aimed primarily at OEM customers.

Software features of the new DECstation systems include support for Fortran IV, commercial Basic and Dibol, DEC's own high-level Cobol-like language. The systems run under DEC's COS-310 commercial operating system and OS/78 is available for program development.

Prices for the 78/50 start at £5,570, while the DECstation 88 models range in price from £7,765 to £16,950 and can have up to 10 Megabytes of disc storage.

The PDP-11V03-L, like the first member of the L System family, the PDP-11T03-L (CW, July 27), is configured around the DEC PDP-11/03-L microcomputer. But the V03-L comes with a dual diskette system, the RX02, providing a maximum capacity of 1.2 Megabytes, while the T03-L has a hard disc system, the RL01, which holds 5.2 Megabytes on each of two discs.

Like the T03-L, the V03-L operates under the new version of the RT-11 operating system, Version 3-B, which makes program development easier. Other software features include the options of using APL, Fortran IV or Basic. DEC says that the V03-L costs 30% less than its components if they were purchased separately, and its prices start at £7,090.

ONE of the Goon Shows was called. . . . "Tales of Old Dartmoor", and with the number of stories that spring to mind concerning Cambridge University's original computer, one could perhaps write down a collection of them under the heading "Tales of Old Titan."

For example, one day a user was trying to get his Fortran program to run from one of Titan's multi-access terminals. It was a hot, humid summer afternoon, when the air hangs heavy and thoughts are sluggish, and he kept on making silly typing and syntactical errors.

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Moral:
An operator's humour
Can be the producer,
Of light'ning the programmer's load.

● **Submitted by John Davidson of Graphic Display Systems, Cambridge who wins this week's £8 Interrupt prize.**

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There is already some electronic music taught as part of the undergraduate music course and, over this year this will be extended formally to include computer music, which involves much more complicated equipment than simply synthesisers. Formal courses are planned for 1979-80. Later a B. Phil. course specifically in computer music may be offered.

IDPM to examine the role of the microprocessor

THE challenge posed by microcomputers to current operating methods in data processing and DP management has caused the Institute of Data Processing Management to establish a group to examine the place of the microcomputer in the DP environment.

This was announced last week at a London meeting of the IDPM which provided DP managers with a forum at which to discuss the real and potential impact of microcomputing techniques in DP.

Ray Sheath of Small Business Computer Systems in Teddington, Middlesex, highlighted the dilemma facing the DPM. On the one hand, he said, given the current acute shortage of DP staff it was difficult to cope with existing software maintenance and development needs. At the same time, however, suppliers of low-cost micro-based systems are beginning to sell directly to the end-user, by-passing the DPM.

Stevenson

Stewart Stevenson, who works in the Bank of Scotland Computer Services Division as well as being chairman of the Scottish Amateur Computer Society, summarised the view of many of those promoting the advantages of micro systems when he suggested that "perhaps once again the amateurs are ahead of the professionals" and cited the availability of voice input on the Apple II as an example of the advanced facilities to be found on the so-called personal computers.

Conway Berners-Lee of ICL pointed out, however, that uncontrolled use of micros could lead to the sprouting of a wide spread of independent databases and processing standards which would eventually have to be co-ordinated through a strong central force if the total system was to work efficiently.

And Sheath pointed to yet another difficulty facing the DPM who becomes involved in a micro-spearheaded explosion in the use of distributed processing, that of dealing with an increasing number of unions who, in one way and other, he said, were becoming increasingly concerned with the growing spread of computing power.

More on IDPM meeting, page 15.
Comment: Computerview, page 2.

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COMPUTER WEEKLY

Vol. 25 No. 624
Thursday, October 26, 1978

Editor
Malcolm Peltu 01-261 8033
Deputy Editor
Tony Higgins 01-261 8666
Advertisement Manager
Harry Hutson 01-261 8022
Class Ad Manager
Brian Durrant 01-261 6567

IPC Electrical Electronic Press Ltd, Dorset House, Stamford Street, London, SE1 9LU.
Telephone: 01-261 8000.
Telegrams/Telex: 25137 BISPRS G

Branch Offices:
Birmingham: 202 Lynton House, Walsall Road, Birmingham 22B. Telephone 021-356 4536
Manchester: Statham House, Talbot Road, Stretford, Manchester M32. Telephone 061-872 4211
New York: 205 East 42nd Street, New York, NY 10017. Tel (212) 867 2080 Telex 421710.

Published weekly on Thursday
Registered at the Post Office as a newspaper. Price per copy 15p.
© IPC Business Press Ltd 1978.

Members of Computer Weekly staff may be contacted directly on the extensions listed below. Other departments in Dorset House may be obtained by dialling (01) 261 8000.

EDITORIAL

Keith Jones	261 8844
Tim Palmer	261 8081
Peter Hawkin	261 8308
Rory Johnston	261 8028
Martin Banks	261 8808
Robin Webster	261 8170
Bernard Allen	261 8038
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ADVERTISING

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Manchester	
Owen Kelly	061-872 4211
Birmingham	
Basil McGowan	021-356 4888
Production	
Ian Carter	261 8018
Ken Welford	261 8678
Roger Albury	261 8518

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Controlled Circulation Department: IPC Business Press (Sales & Distribution) Ltd, 40 Bowling Green Lane, London EC1R 0NE. Tel: 01-837 3636.

Subscriptions for readers outside the above categories: One year, UK £14.50; overseas £20; USA, Canada $52. Students £7.30; overseas £10; USA, Canada $26. Airmail rates on request. Subscriptions: IPC Business Press (Sales & Distribution) Ltd, Oakfield House, Perrymount Road, Haywards Heath, Sussex RH16 3DH. Tel: 0444 59188.

Back numbers can be had as available for 40p post free.

Computer Weekly has a circulation each week of over 62,000 including the highest fully requested circulation in the UK. The International edition, which is published 18 times a year, has a circulation of over 94,000.

ISSN 0010-4787

Naught for the comfort of the poor old DPM

"THE Data Processing Manager has enough on his plate worrying about getting his current systems up and running. So when is he going to find time to bother about all these new-fangled micros?"

That was the heart-rending view expressed at the end of a meeting last week in which the poor old DPM was hammered from all sides (see page 3 and 15).

Organised by the Institute of Data Processing Management and Computer Weekly, the aim of the meeting was to examine the impact of the micro on DP.

The micro enthusiasts depicted the DPMs as a group of mainframe-bound reactionaries, unaware of the wonders of the greatest inventions since bit-sliced breadboards.

Even Conway Berners-Lee, of ICL, had nought for the comfort of the DPM, even though he provided a counter-balance to some of the excesses of the pro-micro brigade.

He pointed out that, as systems became more distributed, there would be an increasing need for disciplined central system design and co-ordination.

He said that too many small systems spread around an organisation could mean the proliferation of unco-ordinated and incompatible databases which would be difficult, if not impossible, to knit together into a coherent system.

Wise words, but ones which bring no solace to the DPM, because they do not say what he can do to cope with the ever-changing computer world.

Ron Yearsley, of BIS Applied Systems, has given one solution to the DPM (CW, October 19), which is to insist that an edict is issued saying that no computer system over £3,000 is purchased without his consent.

That might solve the problem of the unco-ordinated growth of micro-based systems, but it merely adds an extra load to the already overburdening problems facing the DPM.

The most important problems are, of course, how to keep the current workload maintained and running and then how to develop new systems. Yet the incredible shortage of DP staff makes even these basic tasks difficult to handle.

How, then, is the DPM going to hope to do something about, say, word processing, in addition to the existing workload?

The problem becomes more urgent daily, because there are more and more salesmen of micros, small systems and word processors out to capture the heart of the disillusioned "end user."

As Yearsley said, solutions will only be found if the DPM becomes an active agent of change, rather than a passive technician hooked to the past.

That type of action can only be taken on the individual initiative of the DPM. But it should be backed by assistance from the organisations that exist to represent the DP world — support like the vigorous efforts being made by the Computing Services Association and the National Computing Centre to set up a variety of activities to stimulate the kind of training and education that will help solve some of the staff shortage problems which are currently the bane of the DPM's life.

By organising last week's meeting and agreeing to set up a focal point for an ongoing look at the impact of the micro on DP, the IDPM is also offering at least a helping hand to the DPM.

And if the British Computer Society is to succeed in its drive to increase membership (CW, October 19) it will have to take some initiatives in helping the practical DPM to sort out his tangled technological web.

FOCUS

Computing codes of conduct

ACCORDING to Computer Weekly (October 12) a recent Code of Conduct computing conference, held in the States, included lawyers, philosophers and computer people. Not surprisingly, no attempt was made to get the participants to agree on any specific code of conduct.

Few areas of computing appear to generate so much discussion outside the everyday working confines of the installation. Seldom are DPMs confronted with troubled shift leaders politely suggesting that ethical obligations forbid the completion of the job run.

A confrontation is more likely to be on the lines of: "Either the faulty drive goes or I will". Similar sentiments are expressed in connection with the new temporary operator; likewise in respect of the draught from the air conditioning channel above the op control panel.

On their part, senior analysts seldom express concern in social legalities of new application projects. More likely their concern agenda will include:

1. The impossibility of achieving implementation time-scales without a hefty injection of time and personnel resources;

2. The establishment of a user department liaison and translation unit; or,

3. The provision of a new coffee machine adjacent to the systems office.

Following the conference, a report is being issued entitled "Ethical Conflicts in Computer Science and Technology". For most DP managers the conflicts are eminently practical. Will Storage Technology engineers interface smoothly with those of the IBM service team? Will ICL sales object if BASF disc packs are introduced? Will the computer room floor take the strain of the new line printer?

Seldom does the DPM have time or inclination to get involved in social implications of computing. No amount of professional conduct guidelines from the sundry industry bodies will amend and deflect company objectives.

Conflicts for UK DP teams are more likely to involve run compiles, head crashes, JCL errors and late delivery of stationery. Few in the operations team are concerned with the result of their activities, except to see it gets to the relevant dispatch zones on time. For the op team, ethics stop at the job run number.

Only analysts, being closer to the end results, are in any position to evaluate social responsibility and there are few projects — outside State run installations such as the police, health and employment, in this category.

Leaving well alone, however, is not possible. Although certain aspects of ethics such as fraud and breach of contract are covered by law, as Computerview pointed out, ethical judgments are required in the case of breach of confidence or unachieved promises which could bring the profession or organisation into disrepute. Let's hope that Swansea took note.

Before long, remaining areas of ethics could well be the subject of Law. The Data Protection Committee is rumoured to be about to stir and publicise its long-awaited report.

Already a Privacy Conference and Workshop has been arranged for January under the influential might of the IDPM, NCC and NCCL. Codes of conduct will be on the agenda plus no doubt a hefty dose of ethical conflict.

SEMINAR

PRESCRIPTION PRICING AUTHORITY
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A seminar is to be held on 7.11.78 at the Pricing Authority's Headquarters in Newcastle upon Tyne, for Manufacturers' representatives to discuss with Project staff the hardware requirements for practical trials of data collection methods and equipment which are to be conducted in 1979.

For further information ring 0632 25371 Ext. 30

Ten years ago...

COMPUTER WEEKLY — OCTOBER 24, 1968

PROVISION of multi-access graphic display facilities for every design team in its divisional engineering departments was the five-year target of chemical giant ICI . . . The Prime Minister, Harold Wilson, saw an ICL System 4/70 in operation when he opened the National Giro Centre at Bootle . . . Fears that the Russian invasion of Czechoslovakia and the consequent cooling of relations between East and West would cause a cutback in the sales of computers to the East, were proved to be unfounded . . . Orders received by IBM Australia during the past two weeks had given it a large share of the insurance market there . . . The Ministry of Technology's CAD centre at Cambridge was to be managed by ICL, according to a Mintech spokesman . . . Universities were giving inadequate attention to training in management sciences at the undergraduate level, according to Dr M. G. Kendall, chairman of Scientific Control Systems.

Digital adds to DECstation range

OFFERED on an OEM basis and also to end-users is a line of systems added by Digital Equipment to its DECstation series of small business computers. The new machines are the entry level 78/50, which is based on the VT 78 video processor, and five systems configured around the PDP-8A processor — the 88, 50, 70, 80, 00 and 07.

DEC has also announced the second member of its L System line for low-cost packaged systems — the PDP-11V03-L, which is aimed primarily at OEM customers.

Software features of the new DECstation systems include support for Fortran IV, commercial Basic and Dibol, DEC's own high-level Cobol-like language. The systems run under DEC's COS-310 commercial operating system and OS/78 is available for program development.

Prices for the 78/50 start at £5,570, while the DECstation 88 models range in price from £7,705 to £16,950 and can have up to 10 Megabytes of disc storage.

The PDP-11V03-L, like the first member of the L System family, the PDP-11T03-L (CW, July 27), is configured around the DEC PDP-11/03-L microcomputer. But the V03-L comes with a dual diskette system, the RX02, providing a maximum capacity of 1.2 Megabytes, while the T03-L has a hard disc system, the RL01, which holds 5.2 Megabytes on each of two discs.

Like the T03-L, the V03-L operates under the new version of the RT-11 operating system, Version 3-B, which makes program development easier. Other software features include the options of using APL, Fortran IV or Basic. DEC says that the V03-L costs 30% less than its components if they were purchased separately, and its prices start at £7,090.

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This was announced last week at a London meeting of the IDPM which provided DP managers with a forum at which to discuss the real and potential impact of microcomputing techniques in DP.

Ray Sheath of Small Business Computer Systems in Teddington, Middlesex, highlighted the dilemma facing the DPM. On the one hand, he said, given the current acute shortage of DP staff it was difficult to cope with existing software maintenance and development needs. At the same time, however, suppliers of low-cost micro-based systems are beginning to sell directly to the end-user, by-passing the DPM.

Stevenson

Stewart Stevenson, who works in the Bank of Scotland Computer Services Division as well as being chairman of the Scottish Amateur Computer Society, summarised the view of many of those promoting the advantages of micro systems when he suggested that "perhaps once again the amateurs are ahead of the professionals" and cited the availability of voice input on the Apple II as an example of the advanced facilities to be found on the so-called personal computers.

Conway Berners-Lee of ICL pointed out, however, that uncontrolled use of micros could lead to the sprouting of a wide spread of independent databases and processing standards which would eventually have to be co-ordinated through a strong central force if the total system was to work efficiently.

And Sheath pointed to yet another difficulty facing the DPM who becomes involved in a micro-spearheaded explosion in the use of distributed processing, that of dealing with an increasing number of unions who, in one way and other, he said, were becoming increasingly concerned with the growing spread of computing power.

More on IDPM meeting, page 15.
Comment: Computerview, page 2.

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By Dr Richard Stevens

COMPARED with the striking changes caused by the microelectronics revolution, the stability and longevity of the commonly used languages is astonishing. It is like using quill pens for line printers. The two most used languages are Cobol and Fortran, with the business usage of Cobol swamping all other languages.

Both of these hoary old veterans were conceived in the days of small core machines with cherished antiquities like magnetic drums, cards and paper tape. In part, this survival is a tribute to the original architects of the languages, but it also reflects conservative attitudes in the computer world. The training of a programmer is such a long and painful business and staff turnover is high that there is considerable pressure for standardisation in language usage.

The pressure for machine-independent high-level languages will not come from established computer manufacturers. This is shown by the disparity between the great efforts they make to develop hardware and operating systems and their niggling efforts in language theory. The reasons are fairly obvious.

The investment in software, both in the form of programs and understanding of a range of computers and their operating systems, makes it difficult for an organisation to make a radical break from a manufacturer.

The new VAX computer from Digital Equipment was designed to run all PDP-11 software and to introduce the standard command language to all DEC machines and operating systems. Very laudable aims too, but they have the distinct commercial advantage of locking the customer even more tightly to the manufacturer. If truly machine transferable languages and operating systems arrive then it will not be in the commercial interest of larger manufacturers.

However, technological changes will create economic pressure for new languages. During most of the past 20 years it has been more important to save computer time than programmer time. The common languages reflect this — they are oriented towards assembly language routines rather than languages such as Pascal, which use techniques more akin to algorithm-solving.

The significant change wrought by microelectronic technology in the last few years is to make the machine much cheaper than the people who operate it. A Megabyte of memory can be bought for £10,000, less than the cost of a man-year of effort. In 1986 this memory will cost less than £100.

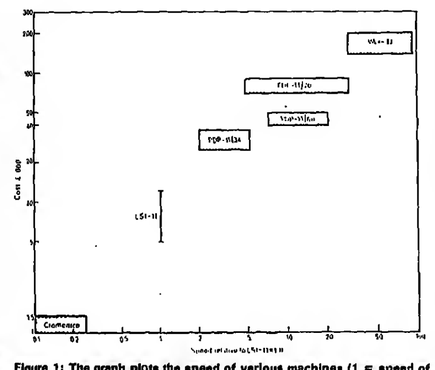
Today, for £5,000, it is possible to buy a processor that would have cost several hundred thousand pounds 10 years ago (all prices are expressed in 1978 terms). If each system needed three programmers (at £10,000 expenses per annum) to run it for its assumed five-year lifetime, then the programmers cost only 15% of the machine cost in 1968, but 3,000% of the machine cost in 1978. The machine is a small and declining fraction of the total cost.

These trends are so striking that any argument about the details of the assumptions is irrelevant. If any substantial inroads are to be made on the computing cost, then they must be made by savings on the programming, even if a more powerful machine is required because of programming inefficiencies.

This in turn indicates that more complex languages must be used in order to cut programming time. The amount of core a language occupies and, to a limited extent, the execution time of the program are secondary factors. The languages must be fully interactive and interpretative rather than compiling. The extent of the inefficiency of coding that can be tolerated can easily be derived from cost analysis of different machines.

For example, DEC produces a range of machines from the single card LSI-11 to the new VAX, which offers mainframe performance for the cost of a large minicomputer a year or two ago. The results of a timing test given to the DEC range are shown in the graph. As a matter of interest, by 1988 the whole graph will have disappeared off the left hand side. The graph shows that in order to produce a tenfold increase in speed there is a tenfold increase in price.

Suppose, therefore, that we have a new programming language which is five times less efficient in program execution but only takes half the time to develop programs. Rather than buy a £5,000 machine which will involve £10,000 worth of programming effort, it would be more sensible to buy a machine at £25,000 (which will execute the programs as fast in the new language) and save £75,000 in programming cost.



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Of course, this is trivial abstraction and there are many other factors, not least human nature, to be considered.

Shortage of programmers (or to put it another way, unwillingness to pay programmers enough) and time constraints on program development will also encourage new languages. Investment in old programs, multiple use of programs and equipment will likewise discourage such a new language.

The results of the above logic are already to be seen in the microprocessor world. If we examine small general purpose systems based on microprocessors (very similar in power to PDP-8s, but cheaper and more convenient) the language that is available for every system is Basic. S-100 bus based systems costing between £500 and £2,000 are good examples.

Obviously when these, or other systems like Intel's Intellec, are used to develop software for £20 dedicated processors a lower level language must be used. The expansion of such work will ensure a continuous demand for assembly language programmers for some time.

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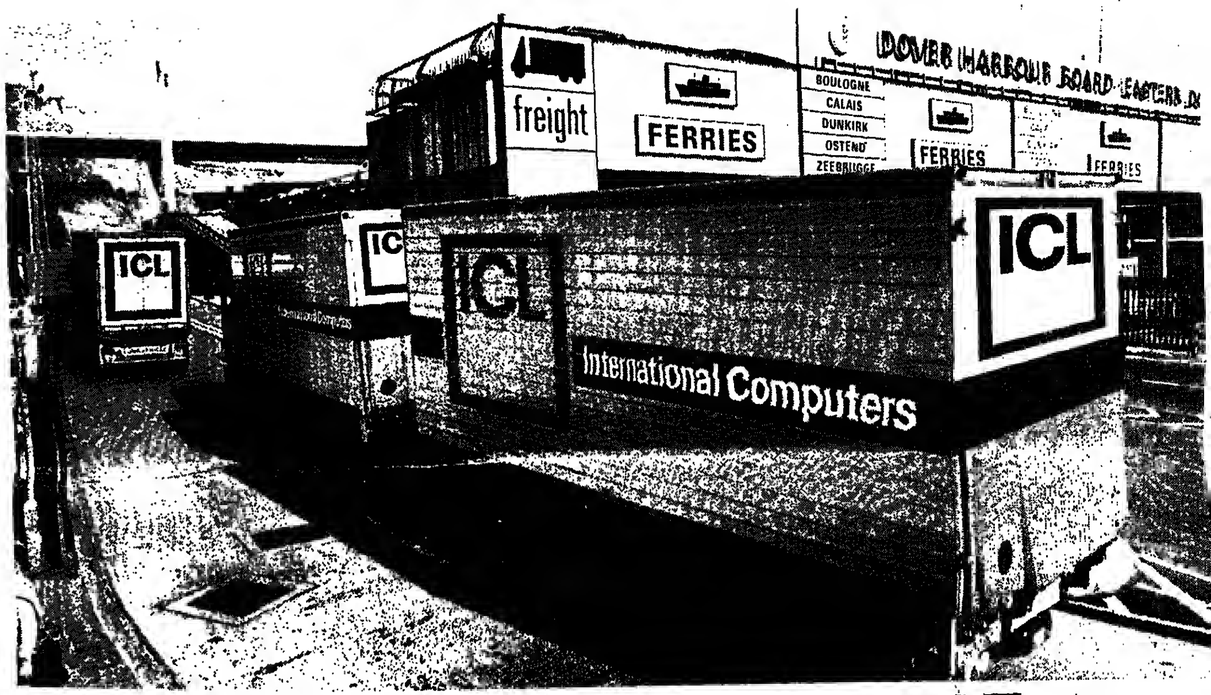

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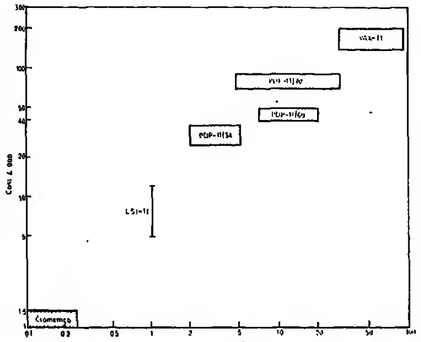

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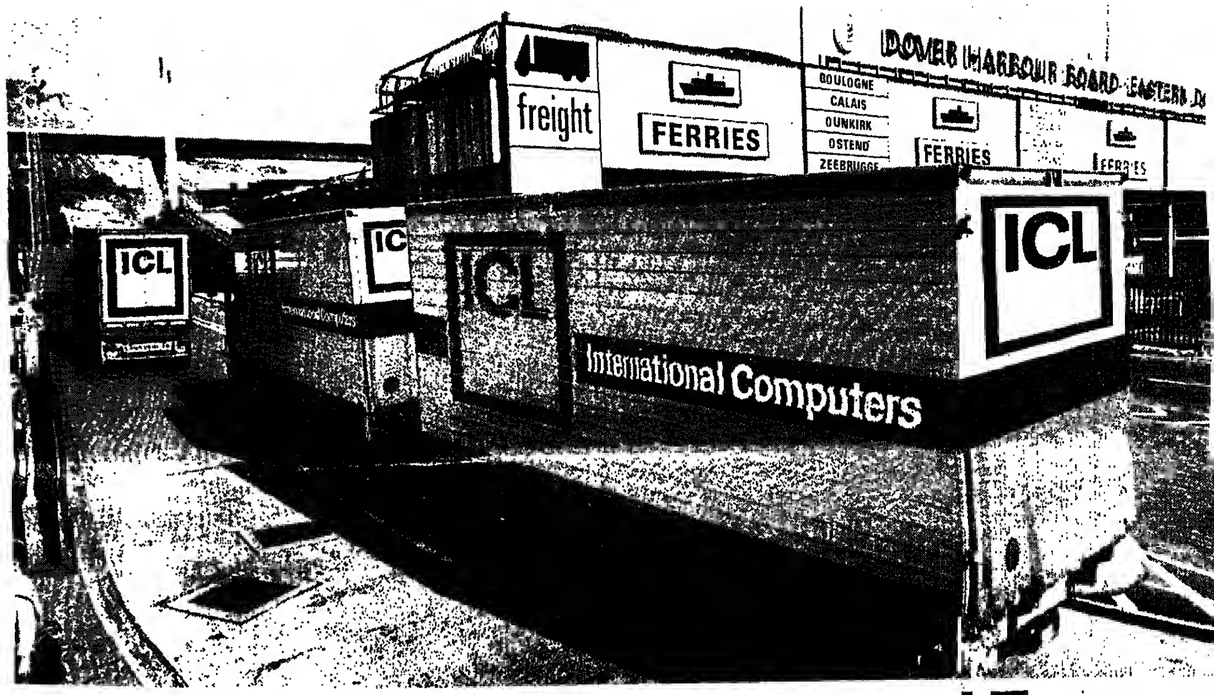

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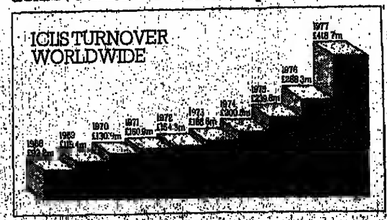

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Profitable growth is our business.

MICHIE'S PRIVATEVIEW

Why AI looks different in California

THIS land of ours nourishes an old, old culture, as we are fond of reminding ourselves. We are even fonder of reminding visiting Americans, usually as an excuse for the absence or non-working state of the technical under-pinnings of life from toilets and refrigerators to portable electric typewriters.

But when this is made an excuse for our being obtuse, backward, doltish, philistine and conspicuously self-defeating about the new computer-oriented culture which is arising in the world, then it is hard to accept sheer age as our permanent excuse.

In this I find myself in sympathy with the 104-year-old man whose visit to his doctor was recently described to a San Francisco convention by my former colleague, Alex Comfort, best known for the hook with the nice drawings, "The Joy of sex."

The doctor smiled benignly and said: "That knee is 104 years old. You're going to have to expect a little arthritial" At this point the patient indignantly replied, "Well, my other knee is 104, too, and it doesn't hurt a bit. Now, do something!"

In something like this style, when one attempts to discover why post-graduates and post-doctorals in UK universities have to go to the US if they want hands-on experience of certain growing-points, the feeling seems to be: That's all right. America's a young, hustling, noisy place, with its own brand of football and its own brand of innovation. We wouldn't necessarily want any of that here! At our age we must expect a little educational arthritis.

Here at Stanford University, where I am tenching an artificial intelligence course for the Autumn term, the landscape leaps with numerous extraordinary activities, centred on the edmputer-based future.

Colleagues in the university collaborate with others at Stanford Research Institute on a vast intelligent databaae containing the whereabouts and vital statistics of some tens of thousands of ships in the Pacific, to be interrogated by Navy personnel in natural language.

At the Xerox Palo Alto Rearach Center, a stone's throw from the university, the outlines of tomorrow's office automation systems are taking shape — robot secretaries smart enough to plan meetings, make and cancel appointments, and explain their actions.

Ed Feigenbaum's heuristic programming project is, of course, familiar to Privatcview readers as the source of such "expert systems" us Dendral for chemiatry and Mycin for clinical pathology and pharmacology. The latest system, Molgen, will put a supercharger into genetic engineering. Watch this space.

Ten miles from the campus stands John McCarthy's artificial intelligence project, where students visit Tom Binford's system for robot vision, and McCarthy ponders the formal logic of how a robot knows that he knows that you know what she knows .....

There, too, you may see the fruits of the world's most advanced system for computer-aidad typography. Half-way through the fourth volume of his monumental "Art of computer programming" the great D. E. Knuth found that his regular printer was not able to deliver to the needed specs. To universal astonishment he forthwith applied himself for 10 houra per day to programming a system to do the job.

Truly there is something in the air, and not confined to the West Coast, which seems to mitigate against sleepiness. At a Boston panel session dealing with "Artificial intelligence and science fiction" the founder of MIT's AI Laboratory, Marvin Minsky, said: "Some people think science fiction is a narrow speciality within general literature. But I say general literature is a narrow speciality of science fiction. While mainstream fiction deals with a few eternal problems, science fiction is not limited in time, space or theme.

"Science fiction is the only non-technical area of human thought that deals with artificial intelligence."

Many will say that that's just where artificial intelligence belongs. It looks different here in California.

Puzzler

Mail order packs is its aim

THE "props" needed for this week's problem are 11 similar discs, such as draughts, backgammon pieces, coins, etc. Having procured these, mark them with colours in some suitable manner — three Red, three Yellow, three Blue and two Green.

The puzzle is to lay them out flat on a plane surface, with no overlapping, in such a way that each disc touches at lenst three others (at the circumference) but no disc touches another of the same colour. See page 61 for solution.

SELLING software by mail order is the aim of n small firm recently established in Reading. CHC Software Marketing hus developed a technique of selling utility packages by post without any need for travelling by salesmen or the customer, and the firm reports surprisingly high response to its mail shots — 14% in one case.

Two products have been marketed so far, both utilities for ICL 1900 or 2900 machines. One is for evaluation of machine performance, plotting graphs of milltime and core usage, and the other is for high-speed reorgnnisation of progrnm library files.

Letters were sent to 740 DP managers on n mailing list procured from the NCC, enclosing un evaluution order form to be returned. A free week's trinl of the software was pruvided to those who replied.

Charles Coultas, CHC managing director, puints out that the documentution for software sold in this way needs to bc very clear and complete, as no support in peraon is available. All of the programs he is selling at present, more of which are in the pipeline, were written hy his own firm, but he would be interested in selling other people's products as well. "There appears to be an enormous market for commonsense utilities."

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WRITE TO BOX 1986

Screen formatting help for HP3000s

SCREEN formatting software to help users develop data entry applications has been introduced by Hewlett-Packard for its HP3000 systems. Called View/3000, the pnekage can opernte either as a stand-alone data entry system or as an adjunct to application programs.

The pnckage enables a user to build menu-style forms while working at a VDU. At the same time, he can rlefine format nnd editing characteristics for euch field on the form. A wide vuriety of editing routines can hc specified in the way, lncluding for example table look-up.

The input parameters thus established are stored in "compiled" form in a Ksam disc file and are subsequently used to control the execution of a general purpose screen input program.

In addition to functioning as a stand-alone data entry system, collecting data for later batch processing, the software can also form a front-end interface for trnnsaction processing.

Extra facilities for Series IV

EXTRA facilities for Series IV, the interactive development system for datu entry and inquiry on the PDP-11, have been announced by Geneva-based Informatic SA. One special feature called "Extended processing Interface" enables Series IV to be used as the front-end processor for applications requiring real time updating of files and databases. Other changes have reduced file sizes by up to 80%, and improved interactive debugging tools.

Terminals, forms, nnd files can be controlled using View/3000 from user programs written in Cobol, Basic, RPG, ur SPL — HP's Algol-based systems implementation language. A data reformatting fucility is included in the package to ease the trnnsition from existing application program methods.

Screen handling software has appeared increasingly over recent years, usually as part of a trnnsaction processing monitor. It was a feature for example of, interdata's Itrac TP monitor, unnounced last yenr (CW, December 8, 1977), nnd has also been recently added to Altergo's Shadow II.

A Hewlett-Packard spukesman pointed out that no TP package is offered on the HP3000, which "provides all the usual features of a TP monitor as part of the operating system."

View/3000 in this respect would appear to resemble the KDSS and Tanc packuges which provide similar facilities under RSTS/E on Digital Equipment's PDP-11 (Software File, April 6).

View/3000 is priced at £50 per month, with an initial fee of £1,000. The spokesman noted, however, that HP's Ksam/3000 access method (CW, February 10, 1977) is a prerequisite to use uf View/3000 so that patential users without Ksam would have to buy both packages.

Why European IBM users are attracted to Tone-3

EUROPEAN users of large IBM mainframes nre being attracted in bulk to nn American software product which was largely unknown on this side of the ocean only a few months ago.

The prodect is Tone-3, a high performance interactive timesharing system which is essentially an implementation of TSO for OS/VS1, and runs for £800 a month in the UK.

The responsibility ot marketing Tone-3 in Europe was assumed by European Software Co earlier this year (CW, June 29). Since then 25 sales have been made and the list of users is growing almost daily. Earlier this week two Scandinavian companies became the first Tone users in their part of the world; other users are situated in West Germany, France, Belgium and Eire, though there are as yet none in the UK.

Tone was developed by Tone Software Co, based in Ann Arbn, California and active only in the US until it concluded its agreement with the European Software Co. Its first sale in Europe, however, dates back as far as 1975.

This customer was Belgische Boerenbond, a Belgian farmers' co-operative which has long been a leading IBM user, and earlier this year became the first Belgian customer to take delivery of a 3033. Boerenbond's DP manager, Guido Van Belle, was in London for a conference last week, and he talked to Computer Weekly about his experiences with Tnne.

Van Belle loarnt nbout Tone in the usual way, from a press report. The claim that it would perform a TSO function under VSI interested him, so he took the trouble to contact the supplier direct in Anaheim, and arranged to go on their standard course. "What opened my eyes was that this course taught me how VSI really functions. It been able to find no IBM course which did this," he said.

"After that there was a half day session explaining how Tone fitted in, following the IBM standards of knowing and using control blocks. After that I went to a test site, and was finally convinced that I should have it."

The experience of using a product which was developed and marketed in the US and totally unsupported in Europe proved "a lot of fun. First of all there is a nine hour time gap between Brussels and California, so my initial calls were always waking somebody up at 4am, which didn't make me very popular. Once we'd sorted out a means of communication, however, everything went well.

"It took time to get the system operational. After six months, and with five system/programmer terminals connected, we got our first user on. There are now about 20, and there've been no problems at all in the past 12 months.

"An advantage that ought to be mentioned is that Tone allows the user to orient his development towards how he will be operating under MVS, so he requires minimal changes at that stage. This is in conjunction with another Tone Software product, ISP, or Inter Spoof Processor, which allows multiple CPU systems to share facilities."

Training centre

A TRAINING and demonstration centre has been opened by software house Pansophic Systems at Ijaselatein, near Amsterdam. The centre has terminal facilities linked to a 370/168 at IBM's Dutch Service Centre so that demonstrations of Pansophic's products and customer training can be carried out, as well as product support for the firm's own technicians. Courses are conducted in eight European languages.

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Len Griffiths joins Gamma board

LEONARD Griffiths, founder of the software consultancy Leonard Griffiths & Associates and formerly head of computing services at Rolls-Royce, has joined the board of Gamma Associates. He takes up the position of Commercial Director, based at the company's Nottingham headquarters.

Griffiths [pictured right] was responsible for the formation and management of the Rolls-Royce computer services subsidiary Systems International which was dismantled in 1971 following the financial collapse of Rolls-Royce.

Prior to his appointment to the board of Gamma, he had been advising the group as a marketing consultant.

Dutch turnkey deal in offing for PCP

A DUTCH systems house, Holec Control Systems, has bought Software Sciences' Plant Control Package with a view to incorporating it in future turnkey systems.

Initial Holec implementations using PCP are likely to be systems for the food, beverage, petrochemical, and gas industries. These projects will integrate PCP with the company's Proglog range of control hardware.

Subsequently, Holec envisages a much wider range of industrial control applications and will be working with Software Sciences on the development of distributed intelligence control systems.

PCP was originally developed by ICI, which earlier this year licensed Software Sciences to further develop and market the package (Software File, March 2). Systems houses were explicitly identified by the company at that time as a significant market sector.

Commenting that PCP combined ICI's application experience with advanced software technology, Holec identified the package's end-user facilities as a significant factor leading to its selection.

A feature of the package, written predominantly in RTL/2, is a high-level language, Plancol, for direct use by control engineers.

'Insulate users further from system changes'

A MAJOR aim of Cincom's Total Information System (CW, October 12) is to insulate the user still further from the effects of hardware or software change than does a traditional DBMS.

Cincom is also explicitly aiming to meet the needs of distributed database systems.

The key component in these plans is the implement of the TIS Data Directory. Via the directory, both end-users and application programs can access data items regardless of the structure and location of the physical database or databases.

This is because the directory, a "total inventory of data items," provides an integral source of information about the characteristics, location, and usage of each data item. Using this information, the TIS software can itself determine a navigation strategy to meet specific data requests.

The system can thus offer a single, transparent access point for data held in different databases, including databases held on different machines.

A possible pointer to the specific distributed database architecture envisaged by Cincom is the fact that the company is well down the road with the implementation of Total for IBM's Series 1 minicomputer.

However an interesting aspect of TIS is that it offers independence from the database management system itself in addition to independence from database design.

While the initial releases of TIS will be built on a version of the existing IBM mainframe Total, an alternative DBMS could be used us the "driving engine" of TIS in the future. While announcing the system, Cincom hinted repeatedly that such a replacement DBMS could be relational in type.

The company was also keen to note that its "superstructure" strategy with TIS would further shield applications from the effects of hardware developments, such as intermediate storage devices.

The practical foundation of TIS database independence is a system of progressive mapping, which begins with what Cincom calls a "logical view."

A logical view is a collection of data items that can be manipulated by a specific user group of users. While application programs may by-pass the logical view mechanism, all end-user access is restricted to those items defined in the appropriate logical view.

TIS holds each logical view as a series of Logic Control Blocks (LCBs), which are translated into physical terms by reference to the directory.

The resulting Physical Translation Blocks (PTBs) are stored in the directory until either the logical view or the physical structure of the database(s) is changed.

Included in the LCB and PTB levels are skeletal definitions of the processing required to satisfy user requests, for example print, display, logic and search arguments.

IBM 3776 emulation software

SOFTWARE has been announced by Data 100 Corporation which enables any of its remote batch terminal systems to emulate an IBM 3776 using binary synchronous communications protocol.

Due to become available in the first quarter of 1979, the software will operate on systems equipped with a VDU, 4,800 bps BSC communications, and one system and one data diskette.

Assisting the police

A PROPOSAL for a £12,000 feasibility study by Pactel for a command and control system for crime detection has been approved by Greater Manchester Police but it has yet to be passed by the Council.

Merger completed

THE purchase of Insyte Corp by Applied Data Research has been completed (Software File, August 31). The takeover was eventually consummated without shareholder approval following advice from Insyte's lawyers that it was not required.

PROGRAMMER NOTES

Now let's get vicious with the supervisors

WHEN in doubt, blame the boss or bad communications. Better still, blame your boss for being a poor communicator.

Hark therefore to the following from a learned article on motivating DP professionals, in the September issue of the American monthly Datamation: "DP people rate supervisor feedback lower than do their counterparts in other professions."

This was one of the conclusions of a survey conducted by J. Daniel Cougar, professor of computer and management science at Colorado University, and Dr Robert Zawacki, an associate professor of a similar ilk at the same university.

The survey took in 600 analysts and programmers and 1,000 in other DP jobs. Like another study published in Datamation based on research carried out by Four-Phase System Industrial relations director Dr Jac Fitzenz (CW, October 12), analysts and programmers turned out to be loners.

That, however, is another story; this week tha .hoot is aimed at the supervisor. Dra Cougar and Zawacki found that DP people gave poor ratings to "knowledge of results" which, the Doctors say, stem from the failure in supervisor feedback because DP people expressed the same degree of satisfaction as the rest of the world in the "feedback from the job itself" category.

"It appears that our supervisors are not doing anywhere near as good a job as their peers in other professions in providing feedback to employees," conclude the good Doctors.

Tha diagnosis is, of course, easier than the cure.

There is, of course, always an instant cure-all. Let Dr Fitz-enz do the prescribing: "More than any other individual and more than another such potent forces as the company itself, the supervisor is the critical element," commants Dr Fitz-enz on the subject.

"Hence it is obvious we should spend more time helping supervisors become good communicators. They are important in both positive and negative situations."

Then comes the inevitable cure-all: "We can achieve the greatest gains by training supervisors at all levels to communicate better."

So, the picture emerging from the studies by the Doctors is of a DP world composed of self-seeking staff supervised by a bunch of incoherent super-users. Not a pleasant picture. But is it true?

The growth of a superstar.

WANG

Nobody has a wider range of computers and word processors.

By Bernard Allen

IDPM is letting in ops— some of them, anyway

IN AN attempt to reflect the changing state of the computing industry, the Institute of Data Processing Management is to broaden its membership to include operations staff.

Institute secretary-general Ted Cluff sees the move as a way of according operators some long overdue recognition.

"I believe that a good operations person is worth his weight in gold. I first came to realise the full value of operators some five or six years ago and have been in favour of them ever since," said Cluff.

But a person looking to enter the Institute will need to satisfy the membership committee that he has sufficient experience both in terms of level and of length of service in the computer industry. He might also be required to take the Institute's entrance examination.

In this regard, Cluff said, "The membership committee will judge experience on the length of time in the industry and the size of the installation the candidate has worked at."

More specifically, he went on, "For example, I don't think we would admit a person who has a couple of years' experience at a small site."

Any person not qualifying for full or associate membership might be allowed to join in a lesser capacity.

According to Cluff, the examination held by the Institute is "business oriented" and any operations person who studied for it would acquire an appreciation of the computing industry in general. He views this as an aid to career progression.

He also considered that by becoming involved in the Institute's activities, operations staff will learn how to communicate with other members of the computing fraternity.

Well, membership of such an organisation might be useful in a similar way to user group participation. That is, members get

Cluff ... "a good operations person is worth his weight in gold."

the opportunity to meet and benefit from each other's experience in relation to solving work-related problems.

But it seems to me that the selection process would eliminate most staff below the grade of chief operator.

Once again, the people who work day and night in the computer room environment are left out. If the IDPM is genuinely interested in the operations scene, it should start by talking to operators about the problems they face in relation to training, shift work and career progression.

The IDPM has branches in East Anglia, Essex, Sheffield, Hull, Central London and West. It also has plans to open new branches in other parts of the country.

Any person interested in the IDPM should contact: Ted Cluff, Secretary-General, IDPM Ltd, 51/54 Goschen Buildings, 12/13 Henrietta Street, London WC2 8NU.

HINT OF THE WEEK

A macro to identify disc volumes under George 2

THE George 2 operating system provides no means by which the operator can find out which volume is on each drive at any particular moment. This creates problems, for a job will fail if a volume it requires is not available to the system.

The operator can interrogate each drive individually or carry out a physical check, but both these methods are impractical in a multi-programming environment.

To ease the matter, use a modified version of the ICL file mapping utility, XPJD, says Brian Miller, project manager at RHP Bearings in Knottingley, Yorkshire.

He says, "With XPJD the user is required to input the serial number of the disc to be mapped and by intercepting the program at the ALLOT (156 order code) instruction, when a line printer is about to be allocated, the program may be terminated without producing any listing.

"The disc will be online as the program will not proceed to this instruction until the disc is available."

He proposes the following macro:

```
MACDEF XPJD 600123
IN ED(PROGRAM DDDD)
LDA XPJD
CDR 3556
ALT 2823 * 7045753
ALT D%A
ENT 3
DISP 'USING DISC %A'
ENDMAC XPJD
```

He continues, "This will cause the EXEC to suspend the operating system and request that the operator loads disc volume 600123."

When the disc is online, the system issues the following message:

```
DISPLAY OK
DISPLAY USING DISC 600123
```

He concludes, "If ICL re-issues XPJD at any time it is a fairly straightforward process to take a core dump of the new program and locate the 156 (ALLOT) instruction and change the address of the 2823 ALTER."

Take steps to minimise chances of system failure, says study

SYSTEM and equipment failures and the resultant downtime have a disruptive effect upon the running of an installation.

In batch environments the chaos can often be sorted out by working overtime later in the day so that the inconvenience experienced by the users is minimal.

But when distributed or interactive systems are concerned any failure, no matter how slight, interrupts the service to the user and might even bring his business to a standstill.

So the DCOM (Data Centre Operations Manager) and his staff should attempt to reduce the number of failures and lessen the effects of those which do occur, according to a portfolio published by Auerbach and called What to Do Before You Call for Service*.

"Because an organisation cannot afford to disrupt its employees or customers the DCOM must take steps to minimize the chances for equipment failure. The DCOM cannot wait passively for something to happen and then call the customer engineer," says the author.

He suggests that some problems can be solved by internal staff, with savings both in terms of money costs and the time spent waiting for the engineer to arrive at the site.

Faulty hardware should be offlined and tested by the DCOM or one of his staff, he continued: "A tape drive, for example, can be advanced forward, rewound, unloaded and the like from the controller. Only after diagnostics have been run should the customer engineer be called."

Having ascertained that the services of an engineer are needed, the operator should contact him and outline the problem at hand.

"Frequently, considerable time can be saved by carefully describing the problem to the customer engineer over the telephone before he comes to the installation.

According to the author, a log should be maintained for each piece of equipment and for the installation as a whole.

In the event of a failure, the log should be consulted to see if the unit concerned is prone to the error.

He says, "Frequently, equipment will give an early warning of impending failure; this is especially true of mechanical components. Such clues are usually changes in the sounds made by the equipment while operating. If such changes are apparent, the customer engineer should be contacted."

Of course, system failures are not so easily prevented, and it is essential that the site has what the author calls "a disaster plan".

"In one installation with an unusual equipment configuration, the disaster plan consisted of renting the full third of a shift from an installation several hundred miles away and chartering a plane to transport input, personnel, disc packs and output. This plan was implemented only once, but chaos would have resulted if the company had not had this imaginative emergency programme," he says.

*Data Centre Operations Management. £120, including bi-monthly updates for this year. Available from Heyden & Sons Ltd, Spectrum House, Hillview Gardens, London NW4. Tel: 01-203 5171.

Operators often complain that nobody listens to their point of view. Well, Op Spot is listening and Bernard Allen would like to hear your opinions and ideas on all matters relating to computer operations.

Your letters should be sent to Op Spot, Computer Weekly, Dorset House, Stamford Street, London SE1 9LU. Telephone calls are equally welcome and Bernard can be contacted directly on 01-261 8035.

TIMES PAST THE TIMES

INELUCTABLE MICROELECTRONICS

..."The importance for British industry of microprocessors lies in their *use*, not their manufacture."

..."either we grasp the advantage or we do not compete at all"...

...software skill is of overriding national importance"...

Extracts from the Times Leading article 2nd October, 1978.

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COMPUTER MARKETING

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Keith Jones reports on the 2900 Club meeting

Compatibility still stumbling block

THERE is still something basically wrong with ICL's attitude to overseas markets in general, and in West Germany the non-IBM-compatibility of ICL systems will prevent ICL from achieving any great success there.

These views were expressed at the 2900 Club meeting in London last week by an ICL user from Germany, Christof Lippold of the Hamburg-based motor parts supplier, Walter Lippold GmbH.

Lippold disagreed with the view expressed earlier in the day by ICL's director of corporate communications, Peter Hall, that IBM compatibility was not important.

He said that German 2950 users were intimidated by ICL's policy of charging for the relatively minor modifications needed to ICL tape drives to enable them to handle IBM-compatible tapes. It cost £800 for an ICL drive to read IBM tapes and £1,000 to write them.

Lippold explained that his company had opted for an ICL system in 1972 because at the time ICL was the only supplier who was prepared to develop the special online order entry software required by his firm. The package developed by ICL is called Autras and Lippold made it clear that he was very pleased with its performance.

Lippold

For this reason Lippold's company is staying with ICL and will soon replace its existing 1901T with a 2950 running under DME. Lippold said that his firm did not really need the power provided by the 2950, but ICL Deutschland had offered him the machine at such a low price in exchange for the 1901T that its offer was accepted.

Lippold commented, "ICL obviously needed a quick 2950 sale to provide them with a good reference customer."

"But I think that a lot of the other 1900 users in Germany will change their suppliers rather than convert to 2900 machines," Lippold added.

According to Lippold, ICL equipment installed in West Germany includes a base of about 1,000 of the 1500 series terminals, about 200 System Tens, 112 2903/4 systems and 41 1900s. To date four 2950s and one 2960 have been sold — all to existing customers. The 2960 is replacing a 1904A at the University of Hohenheim at Stuttgart.

Asked to comment on Lippold's remarks after the meeting, ICL said that it considered its charges for the magnetic tape modification to be modest, compared with the total cost of a 2950. ICL's own figures for equipment installed put the number of 1500s at more than 2,000 and Systems Tens at more than 300, but ICL agrees with Lippold's figures for the 1900 and 2950.

Marks and Spencer does its own thing

PUTTING in a good word for ICL at the 2900 Club meeting last week was Chris Nunn, data processing manager of Marks and Spencer. This is the firm that shunned DP completely for many years, then approached it gingerly through a not entirely successful relationship with the Seric bureau and finally decided to do its own thing with ICL equipment early in 1976.

At that time Marks and Spencer took over a 1904S that had been run for it on a facilities management basis by Seric, and earlier this year the giant retailer added a 2970 to its installation.

M&S paid 25% of the cost of the 2970 when it was delivered and another 50% when it passed the M&S acceptance tests. But Nunn revealed that M&S did not hand over the final 25% till 13 weeks later after the machine had shown that it could meet an acceptable level of serviceability.

Nunn pointed out that M&S plans to continue running the 1904S until 1903/4 and that the 2970 is being used at the moment for developing all the additions and improvements to existing systems run on the 1904S. This is achieved using the MEEP software that enables the 2970 to emulate a 1900 machine. However, completely new systems are being developed on the 2970 in VME/B native operating mode for running live on the new machine.

Honeywell, Burroughs do well

HEALTHY improvement in turnover and profits for the third quarter have been announced by both Honeywell and Burroughs.

At Honeywell, third quarter profit was up 27.5% at $45.9 million on turnover up 21.6% at $864.8 million compared with July-September 1977 figures.

The company reported that its computer business backlog was standing at a record level and that computer rental and service business rose 18% to $170 million. Profits were hit by foreign exchange losses of $2.9 million, reflecting the decline in the international value of the dollar.

Consistently the most profitable mainframe manufacturer after IBM, Burroughs Corp has reported third quarter net profit up 18% at $51 million on turnover up 17% at $875 million compared with the same period last year.

Operators in a TP environment

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Infotech Operations Ltd.

Exploining the intricacies of small business computing to two "prospective" customers is Peter Green, a director of Data Systems Electronics. They are standing outside the company's latest shop in Surbiton, Surrey, just off the Kingston by-pass. Like its Carshalton shop, the Surbiton branch will be selling the Logabox LX2000 range of desktop office computer systems.

Benson gains US entry

HAVING won 50% of the European market for graphics peripherals, Benson of France is entering the US market via an acquisition of Varian Associates' graphics division in a share exchange agreement.

Under the agreement, Benson will issue Varian Associates with new shares, giving it 25% of the combined company; the majority of Benson shares are privately held, but the French Industrial Development Institute has a 34% stake in the company, which will fall to 27.2% on completion of the deal with Varian.

In the last financial year, Benson did about $10 million of business and Varian graphics division about $6 million.

The product lines are fully complementary.

The combined company will be about half the size of Calcomp's graphics division; coincidentally the French IDI and Thomson are planning to invest in Calcomp (CW, October 5).

Announcing Hazeltine 1400

Hazeltine announces its newest and lowest-price addition to the Leadership Line of Economy Terminals, a worthy companion to the famous Hazeltine 1500 series.

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PEOPLE AND EVENTS

Edited by Nancy Pocock

Wokingham centre for Safe

Harrison

A COMPUTER centre for the South of England has been established by Safe Computing in Wokingham, Berks. General manager of the centre will be Mike Harrison, who joined the company this year to set up a Southern support operation.

The centre will support sales of the company's SaFeS production control package, and will also market software services, based on Safe's Solar ledger package for System ten, to small to medium sized industrial organisations.

The address of the new office is Radyne House, Molly Millars Lane, Wokingham, Berks, tel: 0734 791212.

General manager of Safe Computing's new West Bromwich computer centre is Peter Rhodes, formerly a senior consultant.

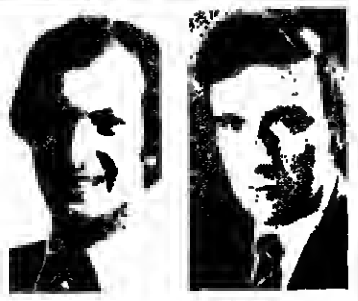
The West Bromwich centre will offer specialist services for ICL 2900 users plus general commercial systems on a bureau basis.

Kevin Ledger, electronics engineer with Logabax, has been promoted to sales engineer with the OEM division.

Clive Hutchinson, who until recently was computer development manager at East Midlands Gas, has become marketing manager of Adabas Software, and George Goslina, previously a systems specialist with Seattle Public Schools, has joined Adabas as a teleprocessing consultant.

Professor J. V. Oldfield has left his post as professor of electrical engineering with University College of Swansea to take up an appointment as professor of electrical and computer engineering at Syracuse University in the US.

Richards Evans



Richardson Pennell

Malcolm Richards has moved from Leasco Software, where he was a consultant, to DCC International, where he will be a senior consultant and will also be in charge of the training facility. David Dabaoham joins DCC as senior consultant, from CMC where he was a project leader.

Tony Evans and **Rex Whittaker** have been appointed to the board of Systems Reliability. Evans, who was previously marketing manager, becomes marketing director; Whittaker becomes financial director; and both retain directorships in AP Electronics, an associate company of Systems Reliability.

Larry Stock has joined Jenson Computer Systems as a technical support programmer maintaining systems software, from CM&G Life Insurance where he was a programmer. John Camelaire has joined Jenson as a trainee programmer.

Pat Muir of Redifon Computers, has been promoted from Southern branch systems manager to systems support training manager, and Steve Richardson, formerly a systems consultant with Donoghue Information Systems, has joined Redifon as systems analyst for the Midlands branch.

John Pennells, former international accountant with the Telex International group, has joined Memorex UK as financial director.

William Reed has become area manager for Raytheon Overseas Ltd. He has joined Raytheon from the US Navy, from which he retired with the rank of Captain after serving in the Office of Defence Co-operation.

Neil Stewart has joined RTC as divisional manager for internal and field engineering services. Previously he was director of engineering with Prime.

Nearly sixty golfers took part in the CMC Sovereign Golf Tournament played on the Brabazon course near Sutton Coldfield. The players were divided into teams of three, one CMC player and two visitors, and there were prizes for the first six teams, plus individual event trophies.

Our picture shows first prizewinners John Nicks (operations manager, Devon County Council), John Groves (operations manager, Somerset County Council) and Tony Hortopp (territory manager, CMC, Bristol), with their prize statuettes and golfing bags. Between John Groves and Tony Hortopp are CMC Birmingham branch manager David Hughes, who organised the tournament, and CMC chairman Roy Parry.

Iain Oldcorn, who until recently was manager, computing department with the Electricity Council, Millbank, London, has joined Foster Wheeler to take up a newly-created appointment within the computer services department, that of manager of the information systems section.

Edward Corell has become vice-president of engineering with Centronics in the US. Most recently he was group engineering manager with Digital Equipment. He replaces David Felton who returns to his previous job as vice-president, quality assurance with Centronics.

Diablo marketing company

THE floppy disc-based small business system Diablo 3200 from Xerox will be marketed on the South coast and in the Bristol area by a company which has just been formed for the purpose, Gresham Business Computers.

The company was formed and will be run by Robert Stevenson, formerly Diablo sales and product manager with the UK distributors Business Computer (Systems). Gresham Computer Services of Southampton has a 40% holding.

The address of Gresham Business Computers is Peerless House, East Street, Southampton, tel: 0703 22200.

● **The Liveware cartoon and Soccer results are on page 11.**

DIARY

OCTOBER 26
Viewdata. Mark Bradshaw. BCS Merseyside branch. Liverpool Polytechnic. 17.45.

OCTOBER 27
Some theoretical issues in language acquisition. Prof H. C. Longuet-Higgins. Computation/Linguistics, University of Oxford. Dept of Experimental Psychology, South Parks Road, Oxford. 17.00. Details: Mrs S. M. Hockey, tel: 0865 56721.

OCTOBER 27-NOVEMBER 2
Electronik 78 — electronics fair and seminar. Association of Electronics Manufacturers in Denmark. Bella Centre, Copenhagen.

OCTOBER 30
X-ray computed tomography. E. Horn. IEE. Savoy Place, London WC2. 18.00.
Computers in television. Terry Smith BCS Cheltenham & Glos branch. Queens Hotel, Cheltenham. 19.30.

OCTOBER 31
Computer usage in Grand Prix racing. Dr Karl Kempf. BCS, College of Technology and Design, Blackburn, Lancs. 19.30.

NOVEMBER 1
Using small computers. Study Group on Computers in Survey Analysis. City University, London EC1.
AGM. CMC Users' Association (CUMAC). Wigston Stage Motel, Leicester. 10.30. Details: Maidenhead 20325
The diagnostic electron, Faraday Lecture, IEE Swansea.
Structured program design. William Spence. BCS Edinburgh branch. Mountbatten Bldg, Heriot Watt University, Edinburgh. 17.30.

NOVEMBER 1-2
Sensitivity analysis for computer-aided circuit design, seminar. Robert Spence. Dept of Electrical Engineering. Imperial College, London SW7. Details: Joan Jeffery, 01-589 5111, ext 1470.
Heat exchanger design. Computer Aided Design Centre. Cambridge. Details Dr P. Winter, Tel: 0223 63125.

NOVEMBER 2
Untapped brainpower the severely disabled can contribute. Neil Rose. BCS Oxford sub-branch, Archery Unit, Stoke Mandeville Hospital, near Aylesbury, Bucks. 10.45.
Interactive engineering design, the inside story. Dr John Knapton. BCS Newcastle branch/IMA; YMCA Bldg, Ellison Place, Newcastle. 18.00.

NOVEMBER 2-3
Programming Group meeting. IBM Computer Users' Association, De Vere Hotel, Coventry.

NOVEMBER 3
How computers look at texts, seminar. S. M. Hockey, Computation/Linguistics, University of Oxford. Dept of Experimental Psychology, South Parks Road, Oxford. 17.00. Details: Mrs S. M. Hockey, tel: 0865 56721.

NOVEMBER 6
Applications of microprocessors in telephone exchanges, colloquium. IEE, Savoy Place, London WC2. 14.00. Register with Secretary, ref. LS(DA).
Planning and project resources timating techniques. Neil Prebble. BCS Anglia branch. Thomas Paine Hotel. Thetford. 19.00.

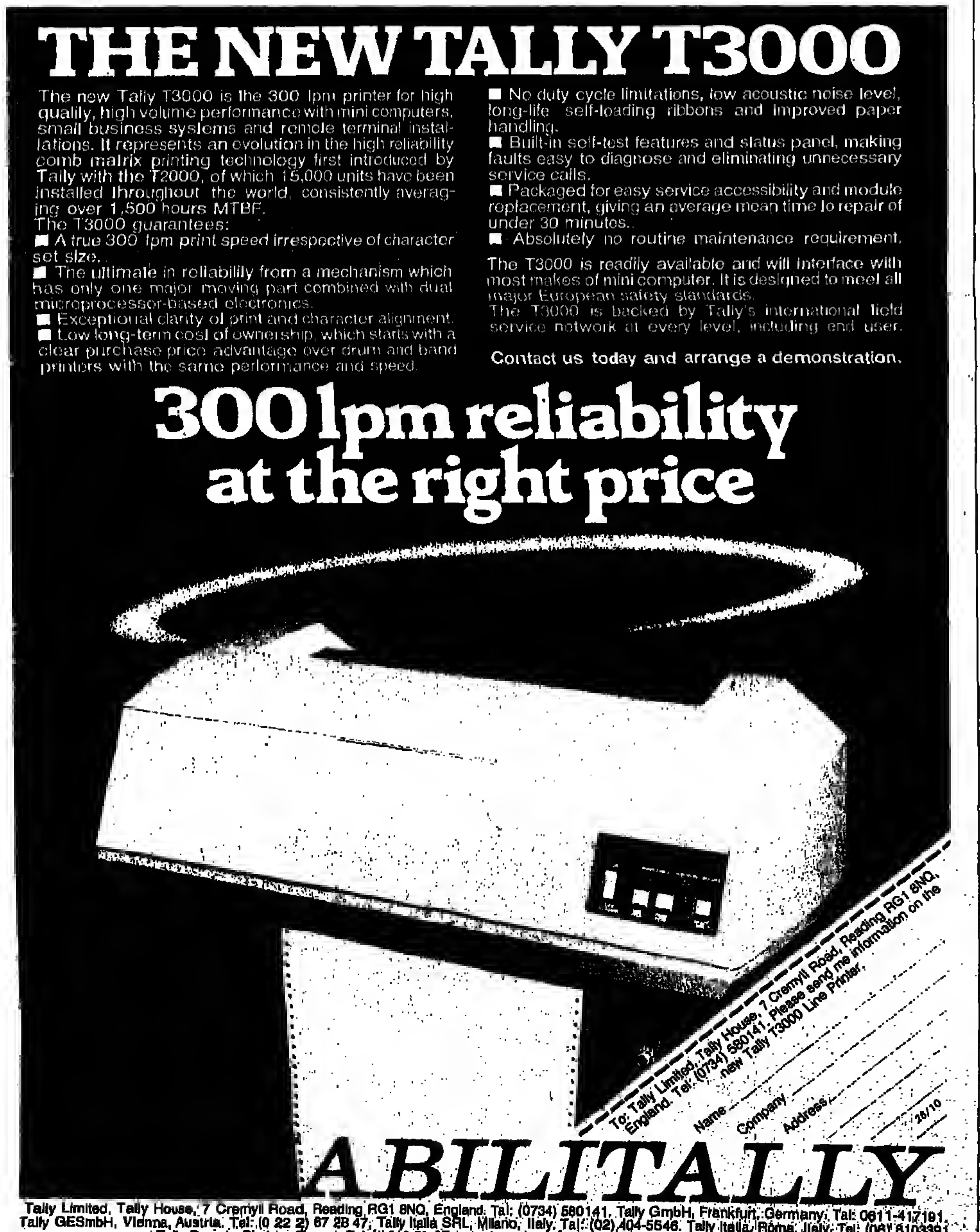
NOVEMBER 7
Experience in the use of computer terminals at the supermarket checkout. D. Harris. BCS NW London branch. Railway Hotel, Greenford, Middx. 19.30.
Practical approach to installing computers for purchasing and supply, conference. Institute of Purchasing and Supply. Excelsior Hotel, Heathrow Airport, London.
Introduction to microprocessors. C. Blake. IEE Hatfield Section. Hatfield Lodge, Hatfield, Herts. 18.30.
Bench marks. BCS Birmingham branch. Priory Dene Hotel, Edgbaston. 18.30.

NOVEMBER 7-9
Minicomputer forum. Bloomsbury Centre Hotel, London WC1.

NOVEMBER 7-10
Pattern recognition. 4th International joint conference. International Association for Pattern Recognition. Kyoto, Japan.

NOVEMBER 8
Computer architecture. Prof Frank Sumner. IEE, Savoy Place, London WC2 17.00.
Future of computing. David Fimberg. Association of Independent Computer Specialists. National Liberal Club, 1 Whitehall Place, London SW1. 18.00.
Data dictionary systems, seminar. BCS Data Dictionary Systems Working Party. Imperial College, London SW7. Register with BCS.
Supersonic evening. BCS Kingston-on-Thames branch. Regional Management Centre, New Malden. 19.45. Tickets £1.50. W. F. Webb, 14 Titchwell Rd, London SW18.
Micros today. Justin Forder. BCS N London branch. West Lodge Park Hotel, Cockfosters. 19.45.
Visit to NPL. BCS Displays Group. Teddington, Middx. 14.15. Book in advance, 0483 71661, ext 47.
Problems of the computer operator, forum. BCS Kingston-on-Thames branch. Regional Management Centre, New Malden. 18.00.
Holography, engineering applications. F. N. Birkett. IEETE. Dept of Mechanical Engineering, Loughborough University 19.30.
The role of the computer in ... management. D. Hilder. BCS ... Staffs branch. Post House Hotel, Newcastle-under-Lyme. 20.00.
Visit to JCB. BCS Wolverhampton branch. Uttoxeter. Numbers limited, contact G. Hamer Wolverhampton 27871.
COTEN: the BSC network. ... Davis. BCS Teesside branch. Teesside Polytechnic, Middlesbrough. 19.00.
Microprocessors in business. BCS Humberside branch. Willerby Manor Hotel, Hull. 19.30.

NOVEMBER 8-...
US ... exposition ... Datamation ... Washington ...



Pricing policy for IBM 8100 software

UK PRICES have not yet been set for the software on the new IBM 8100 (CW, October 12), but the major queston of how the pricing policy will work has now become clear.

Users with one 8100 will have to pay standard monthly licence fee — $150 in the US — for the DPPX native mode operating system. This price includes software maintenance and application of program fixes by IBM. Users with more than one 8100 will have to pay separately for the operating system on each processor. However, they will have a choice. If they want IBM to perform software maintenance at each site, they will have to pay the full licence fee for each copy.

If, however, they are prepared to do the maintenance and fixes themselves, they can opt to pay the full price, with maintenance, at one site, and go for the Distributed Systems Licence Option, DSLO, at all the other sites. DSLO on the DPPX operating system costs $133 in the US.

DPPX is just one of a portfolio of software offerings with the 8100. Of the rest, probably the most significant is what appears to be a new database management system, about which few details are yet available.

Called DTMS, Database and Transaction Management System, it is said by IBM to be like CICS/VS, which implies that it is a multi-threading system.

Several new hardware units have been introduced on the 8100, and the digit 8 seems to be the prefix numeral to look out for to identify really new items introduced in future by IBM's DP division — as opposed to the 3730 word-processing system and indeed the 3030 series of mainframes, which are effectively extensions to or new models of existing product lines.

There is a new family of terminals which will eventually succeed the 3270 series. First model is called the 8775, and was developed in the UK. It is microprocessor-controlled, and incorporates 18K-bit memory chips, and features screen partitioning into up to eight segments, field validation, and four levels of highlighting. The screen is tilted and rotated to prevent reflections and screen capacities of up to 3440 characters are offered.

The 8130 processor is the only one currently using the new 64K-bit memory chips; it operates at 0.3 MIPS, million instructions per second, while the 8140 operates at a formidable 0.5 MIPS. To give an impression of what this implies, IBM rates the 370/138 at 0.3 MIPS and the 370/148 at only 0.43 MIPS.

Either processor comes with an integral 64 Megabyte disc drive, and up to four new 8101 disc units, which US sources believe incorporate some very advanced technology, can be added to the central processor. Maximum disc capacity is presently thus 320 Megabytes.

Overall, Advanced Computing Techniques, the New York research company, estimates the price-performance of the new units as three times better than that of the 3790.

Memorex stock 'bombed'

"IF the stock market looked like a battlefield yesterday, then what happened to Memorex stock has to be called saturation bombing."

In these graphic terms, the Wall Street Journal reported New York's reaction to worse than expected profit figures from the diversified computer peripherals company. The shares fell as much as $11⅞, that is 23%, before closing $10¼ off at $10⅞ following announcement of third quarter profits up only $100,000 at $15.0 million on turnover up 33% at $152.0 million, compared with the third quarter of 1977.

Memorex financial vice-president Henry Montgomery described the slide in the share price as over-reaction and pointed out that the company's fourth quarter was traditionally its best.

End of Century

TO keep pace with higher demand, UDH Automation, the Edgware-based computer bureau, has brought out an NCR Criterion V-8570 system to replace an NCR Century 300.

Users' needs must be DPMs' priority

DEALING with users successfully depends on organised, systematic communication with them, according to Nigel Laurie, consultant and expert on IBM. Too often the data processing manager overlooked the need to involve the user departments in his organisation with the analysis of their needs and the plans to solve them, Laurie said.

Laurie was presenting, for the second time, a workshop on Successful User Relations, sponsored jointly by Computer Weekly and the Institute of Data Processing Management. Nearly 40 DPMs from a wide range of commercial organisations and government bodies gathered at the Holiday Inn, Marble Arch to take part in the day-long workshop which consisted partly of lectures by Laurie and partly of group discussions of users' needs and hypothetical case studies.

Clearcut strategies for DP management are particularly hard to establish now, Laurie said, because of developments such as convergence of computing and communications; divergence of usage, giving users more control; and increasing concern in society that "the bottom line is not enough" — that the needs of customers, employees, and society at large must be considered.

The notion, however, that minis and micros are "democratising" information in the same way as printing did is misleading, according to Laurie. Printing led to standardisation, whereas the spread of minis and micros, each with a different architecture, is decreasing standardisation, presenting a major management problem.

Among the communications channels available, Laurie pointed out the establishment of task forces involving both users and DP staff as particularly useful. Although they are ostensibly meant just to get a particular job done, they also teach people about problems, and are a common experience.

Other useful channels are: induction courses, newsletters, hot lines, audio-visual presentations, and enquiry desks. There is a danger, however, Laurie pointed out, of becoming preoccupied with the media rather than the objectives.

Ferranti-Inmos link rumours discounted

RECENT speculation on the possibility of the semiconductor operation of Ferranti being merged with Inmos, the NEB's new microelectronics company, were firmly discounted last week by sources close to Ferranti.

The apparent cause of this speculation seems to be the fact that the National Enterprise Board owns Inmos — and 50% of Ferranti.

There are two main reasons why such a merger is unlikely, the sources state. Firstly, the Inmos route of entering the market for high volume standard devices is one that Ferranti has studied, and discarded. The company is understood to want no part of plans that include a head-on clash with major US and Japanese manufacturers.

Secondly, the two are technically incompatible. Though it has an MOS processing capability, Ferranti is primarily operating as a specialist bipolar house, with its collector diffusion isolation process.

This incompatibility stifles the one opening for a merger, the opening being followed by GEC in its venture with Fairchild. This is where a small, specialist device operation can be complementary to a high volume standards company. This only holds, however, where there is process compatibility to allow for technology spin-off.

Another factor is Ferranti's discrete component work, a successful operation in manufacturing individual transistors. This would not complement the Inmos drive towards "systems on silicon."

There is of course scope for collaboration and co-operation between the two companies, for Ferranti is building up sales of dedicated peripheral chips for microsystems using its uncommitted logic array technique. This uses an array of logic gates, in chip form, that can be rapidly connected together in any desired configuration by a final metallisation process.

However, as the sources indicate, such collaboration does not require the companies to be merged. As one said, "It would be just as feasible to arrange such a deal with any semiconductor company."

Liveware Saga

by Don

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ICL film on how councils use computers

A FILM showing how local authorities use computers, not only in financial control but in managing housing and social services, has been produced by ICL. The commentator is TV journalist Trevor Philpott, and the aim of the film is to influence councillors and ratepayers who are still suspicious about computers.

The film makes the point that local authorities currently spend £15,000 million a year on an increasing variety of complex services, all of which require efficient information management.

Examples are shown of the use of computers in the allocation of council housing, matching up properties available with families on the waiting list, taking account of number of children, special needs, and so on. The machine calculates the number of "points" each family has, to determine their entitlement.

Graham Goodhead, housing director for Manchester, appears in the film, and in extolling the value of the computer he asserts, "The shortage in housing has not been money or land, but good information."

In Leeds, social workers' case histories are held on computers, as the film shows, providing automatic reminders of the need for follow-ups.

Finding suitable foster parents for abandoned children is one of the tasks of social service department machines in Gateshead. All of these applications require careful confidential controls.

The fast-spreading teaching of computing in schools is also touched on. The film, entitled "the Computer in its Place," was made with the co-operation of LAMSAC and is available for hire from ICL for a nominal charge.

● A teacher and schoolchildren are pictured using a terminal, while at work behind the camera are film director Julian Aston and cameraman Ivan Strasburg.

Swift interface facilities for City accepting houses

INTERFACE facilities to the Swift international banking network are being offered to accepting houses in the City by Ariel, the computer based stock dealing service, as a means of expanding and diversifying Ariel's business, which at the moment is profitable but sluggish.

The Swift interface service is being promoted by Ariel's new managing director, Garry Arnott (CW, October 19), who told Computer Weekly that it would be run on Ariel's Digital Equipment PDP-11/40 systems which are under-used at present.

Arnott said that the PDP-11s would run Arbat's Swift interface software and that modifications costing no more than about £2,000 would be needed to enable the system to service multiple users.

Arnott pointed out that 17 accepting houses already use Ariel for stock dealing, and that several of them were interested in forming a syndicate to use the proposed Swift service because in addition to their stock business they had very active currency dealings involving typically between 250 and 500 telex messages a day.

Arnott also hopes to boost Ariel's existing stock dealing business in several ways.

In the short term he intends to modify the Ariel stock dealing procedures so that users can consummate their deals over the telephone instead of solely via display terminals. He believes that the lack of personal and congenial contact between Ariel users has been one of the main reasons that the service has not been as great a success as was once expected.

At the same time, he recognises the danger of Ariel losing commission through clients bypassing the computer system by settling over the telephone.

In the longer term Arnott hopes to encourage Ariel's institutional clients to develop stock jobbing operations using the system.

For the last nine years Arnott has been a consultant at the accepting house, N. M. Rothschild, an existing Ariel user, where his work has included developing financial models using computers. He plans to develop a model of how Ariel works using the comprehensive records of Ariel transactions accumulated since the system first went live.

Selling telecoms in the Third World

SELLING telecommunications equipment and expertise in the Third World is extremely difficult, and the handful of billion dollar contracts are hard-won.

Some guidelines and warnings were given at a seminar sponsored by the US Embassy in London last week, in talks by specialists in Africa, the Middle East and Latin America.

The problem in Africa is that the benefits of improved telecommunications are much less perceivable than those from better roads, more education and a higher standard of medical care.

Thus, for example, in Nigeria with 52,000 telephones for a population around the 70 million mark, anyone who wants to make a business contact tries to drive to his destination. But traffic congestion is so bad in Lagos that only cars with even numbered plates are allowed on the road one day, only odd numbers the next.

Rexford Owusu, Ghanaian journalist, who writes about telecommunications for Africa magazine, used the example of Lagos to underline the desperate need for better telecommunications in Africa.

Craig Blackmen, now publisher of Telecommunications, who has experience of selling communications equipment in Africa for Harris Corp, advised that anyone trying to solve the problems needed exceptional patience, and underlined the need for extended training programmes by companies selling equipment.

A country-by-country analysis for Harris indicated that business could be done in Kenya, the Ivory Coast and Cameroun, and that Nigeria, Libya, Tanzania, Egypt, Senegal, Guinea and the Sudan were all promising.

Telecommunications in the Persian Gulf states are now extremely sophisticated, and business acumen has rapidly been acquired after the rip-offs of the first two years of the oil boom. That, anyway, is the view of John Whelan, telecommunications correspondent for Middle East Economic Digest.

Whelan's advice to potential salesmen is to keep a close watch on the movement of personnel within the government; if you do not talk to the man who has ultimate responsibility you are probably wasting your time.

Dr Tom Will, correspondent on Telecommunications magazine suggested five vital factors for success in Latin America.

A company needs to sign up outstanding local representatives, must make a long-term commitment to the country, should acquire "superb" marketing intelligence on changes in government personnel, recognise that financial packaging of the deal was often more important than the latest technology, and that labour-intensive equipment may still be relevant.

The occasion was staged to promote the big Intelcom 78 telecommunications conference and exhibition, which will be held in Dallas, next February 26 to March 2. Further details of Intelcom 78 are available from Horizon House International, 26 Victoria Street, London SW1H 0EX. Tel: 01-222 0466.

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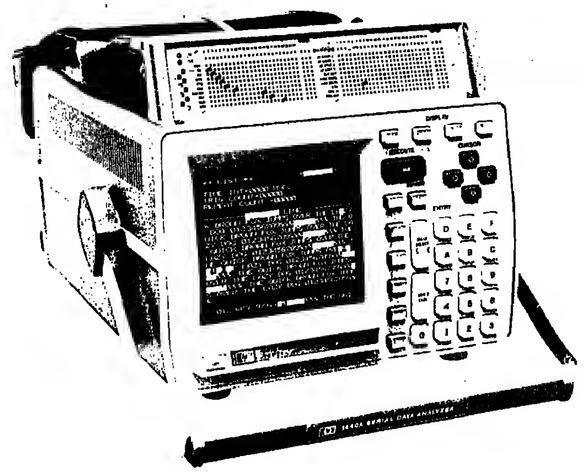

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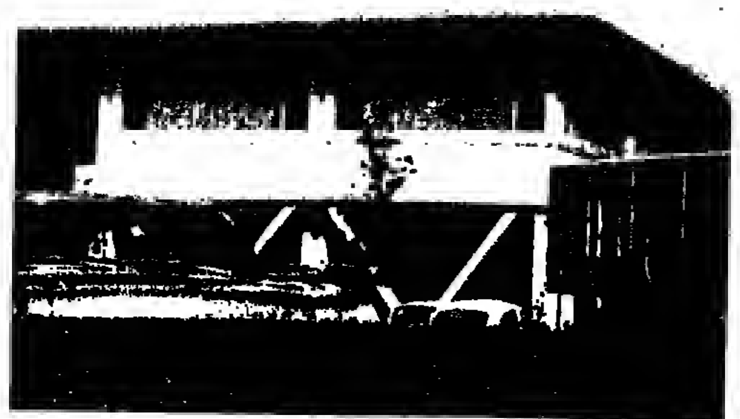
MICRO NEWS—1

With sales of about $400 million as the target for 1979, Intel continues to be a force to be reckoned with in the microprocessor business. On a recent visit to two of the company's facilities in Santa Clara, California, Micro News editor Martin Banks discovered that Intel has some different views on the future development of the microprocessor business from those of other companies in the field.

For example, there is little interest in the recent rise in popularity of Pascal as a high level language for the 8086, 16-bit processor. Unlike others, Intel will not be supporting it. Also, though some companies suggest that the new 16-bit micros will bite deeply into the existing 8-bit microcomputer market, Intel seems content that this will not happen.

Intel pursues its own line in the Santa Clara valley



Santa Clara 4, home of Intel's design, development and marketing effort for microcomputers and microprocessors. From here comes the development work on the 8048 family of single chip devices which, according to the company, will not be superseded in the controller market by the new generation of 16-bit microprocessors.

THOUGH the corporate address for Intel is given as Bowers Avenue, Santa Clara, the company is now spread all over the Santa Clara valley in California, and one of the latest additions to the company's roster of facilities in the area, referred to as Santa Clara 8, is now the home of the Intel software development effort.

Recently leased from Fairchild, where it was used as that company's base for its now defunct digital watch operation, Santa Clara 8 is where Mike Kane, software product manager for Intel, has been working on the software to make the 8086 a living part.

This 16-bit microprocessor, which the company claims has a processing power equivalent to a Digital Equipment PDP-11/34 minicomputer, has been waiting since its introduction early this year for a new version of Intel's PL/M high level programming language, and now Kane has some of it ready.

Known as PL/M 86, it is a derivation of the original PL/M software written for the 8080 processor that has been expanded to take advantage of the increased instruction set of the new processor. Its development will probably represent a high spot in Intel's software development for some time, for although the company has recently introduced an ANSI-standard Fortran compiler to run on the 8-bit 8080, it is not really interested in other applications-oriented languages.

For example, Kane said that Intel had no plans to introduce a Cobol compiler, and although he thought Pascal a well-structured language that had things going for it, even suggesting its growing popularity made it "a people's language", no plans exist to produce this language for the 8086 either. He did suggest that its future could develop with 16-bit devices, but said that software such as Pascal was not Intel's market.

His task, he said, was to provide tools for the development of microcomputer systems.

While still compatible with the PL/M written for the 8080/8085 processor, PL/M 86 offers several new capabilities, especially the range of supporting utilities that are available. One, for example, is the Quick Relocation Load facility, which is a combined code providing a linking loader. This takes care of segment ordering and segment loading, thereby minimising the number of disc accesses required.

Another is LIB-88, a collection of relocatable object packages based on the earlier LIB-80, while a third is a PROM programming package.

Further additions, according to Kane, are currently in the pipeline awaiting announcement. These will probably include an Assembler package for the 8086, together with a preliminary Assembler package.

Though Kane states that the company is not interested in applications oriented languages, it has already produced one, the ANSI-standard Fortran 77, and there are indications that another, Basic, is about to be launched.

The Fortran compiler, which was introduced in March, meets the latest ANSI sub-set standard, with the main exceptions of double precision arithmetic and complex data types. According to Kane it has been introduced by Intel because it is still a good development language, despite its applications programming orientation. Full run time support under the real RMX time executive is soon to be available for this.

The rumoured Basic interpreter is believed to be scheduled for launch some time this month, although Kane was not willing to comment on this. The suggestion is that it will be a 32K byte extended Basic package, designed to meet the ANSI standard for Minimal Basic.

This, in common with the other software offerings from Intel, will implement the new Intel Maths Standard. This is a set of maths algorithms that have been developed by the company. The hardware is a single board system known as the 3/10, a 32-bit, memory-mapped board that uses mainly bipolar logic and firmware program memory. It is used to run single precision floating point maths, and according to Kane, when coupled to an Intellec development system running Fortran 77, becomes a very strong tool.

For example, it greatly increases the added value of the development system by allowing users to run many of the general engineering packages that are widely available in Fortran.

Intel as a whole is doing very nicely, having turned in sales of over $280 million in 1977, and is planning for sales of the order of $400 million by the end of 1979. A growing slice of this business is now coming from Europe, which is generating an annual 25% growth in Intel's sales volume.

One of the lead products in this growth is the 8048 single chip microcomputer.

The original device in a growing family of single chip products, the 8048 has a strong long-term future in the Intel scheme of things. Unlike Motorola, which has suggested that the coming ranges of 16-bit microprocessors coupled with high level languages could eventually bite deeply into the current market for 8-bit devices like the 8048 (CW October 12), Jeffrey Miller, product manager for the microcomputer family, feels that the development capability of the 8-bit devices will continue to give them the

● Turn to page 15

CORAL NEWS

Coral News appears every quarter to provide users with up-to-date information, news and opinions. Items for inclusion should be sent to the Coral Press Co-ordinator The National Computing Centre, Oxford Road, Manchester M1 7ED.

Standardisation

BSI's Work Group concerned with programming languages for industrial use are issuing the draft British Standard at the end of October. The draft incorporates the original official definition which became known as the blue book and will be submitted to ISO as the first stage in Coral 66 becoming a standard international programming language

CORAL Availability

New Coral 66 compilers have been announced by HPAC for Perkin Elmer (Interdata) 8-32 and Data General Nova. Compilers are available or under development on machines from the following manufacturers' ranges: CII, Computer Automation, Control Data, Data General, DEC, Ferranti, GEC, Honeywell, IBM, ICL, Intel, Kongsberg, Modcomp, Motorola, Nord, Nordan, Perkin Elmer, Plessey, Prime, Rank Xerox, SEL, Smiths Industries, Sperry Univac, Texas Instruments.

Official MOD approval has been granted to Modcomp for their compilers for Modcomp II and IV. For up to date detailed information on Coral 66 compiler availability ring Malvern (06845) 2733 ext. 2166

Books

NCC received "a small round of applause" from Computer Report for publishing Coral 66 Programming. CR said that the book by John Webb "offers solid information about the concepts and facilities of the language and deals in considerable depth with the practice of Coral Programming". The book is £5 and at the same price is NCC's A Course in Coral 66.

Training

Courses in Coral 66 are regularly offered by several organisations including CEGB, Ferranti, GEC, NCC and SDL. NCC's Real Time Program Design Course was developed for the Coral 66 Group and runs for 2 weeks starting 23 October, 19 February and 4 June.

MASCOT

MASCOT — Modular Approach to System Construction, Operation and Test — is an integrated approach to design, implementation and testing of real-time parallel processing software based on a form of modular decomposition.

Development is being controlled by a joint industry — MOD group with major work packages being undertaken by software houses including CAP, Software Sciences Limited, and Systems Designers Limited. Commercial products using MASCOT are being developed. 2-day workshops on MASCOT are being run by Infotech starting 24 October and 30 November.

CORAL 66 in Rome's Police Communications.

A CORAL case study

CORAL 66 helps to control half of Bavaria's electrical power. The language is used for the operating software and all the programs used in the computer system of the Central Control Room of the Bayernwerk Electrical Power Authority in Munich, West Germany.

Bayernwerk generates 3500 MW from nuclear, coal, oil and hydro electric power stations and the British firm of Ferranti were chosen to supply the control computer as well as the visual display equipment and the standard software.

Bayernwork's new control centre schedules the generating stations and supervises the load and frequency including exchanges with local networks. The control room has two operating desks. One desk is for load despatch and a 380/220 KV network and the second for a 110 KV network. Each desk has three 23" CRT displays on which symbols and lines represent items, their states and voltage levels. A diagram of a station shows its active and reactive power as well as the voltage and current alongside each named circuit.

Overall views on the screens show the entire network with colour representing the voltage of interconnecting lines. Greater detail can be examined by stepped magnification up to single stations. Where a station diagram is too large it can be rolled across the screen.

The security features of the system range from badge readers for the operators up to sophisticated on-line safety checks. The latter assess the outcome of an input command and inform the engineer of any critical conditions resulting from his instructions. The system collects accumulated meter readings for billing purposes and loading information. It can also cater for future modifications to the network.

The work is handled on a symmetrical dual computer system; each half having an ARGUS 700E with 32K words of store front ending an ARGUS 700S with 112K words and 12 megawords on moving and fixed head discs. The ARGUS 700 computers were designed with CORAL requirements in mind giving a particularly efficient implementation.

CORAL Applications

The West Midlands Police have an operational system for which Coral 66 was used to write all the applications and systems software. The computerised command and control system centres on dual Ferranti Argus 700S processors.

Coral 66 has been used intensively on the development of Hoskyns new system for the Hotel Industry. The system is based on the Intel 8080 with visual display unit, matrix printer and floppy discs. The system covers check-in, room status, enquiry and control and is said to be suitable for beyond 100 beds.

Brampton and Hampton offer two new support packages which are themselves written in Coral 66. VAULT for file handling and a preprocessor which relinquishes and l.tons rationalise. These and their earlier packages CDSH (String Handling) and COIN are all available for DEC equipment but they are prepared to translate them to other versions. Brampton and Hampton can be reached at Cambridge 881726.

CEGB's new software system COMPASS will be written in Coral 66. COMPASS is intended as the future standard for all of the Board's real time on-line computing and will be available to outside equipment manufacturers.

By the end of the year the MOD should have a MASCOT Kernel for use on a Ferranti F100. This is the outcome of a contract placed with Y-ard for the real time executive which will be written in Coral 66. The kernel is intended particularly for memory resident applications and is likely to be initially used in a distributed control system for ship power plants.

The growing complexity of satellites has resulted in bottle-necks in the testing system used by European Space Technical Centre (ESTEC). The system consists of CTL computer interface via CAMAC to the measuring equipment. CTL have developed a new controller for the faster data rates and the programs were written in Coral 66.

CORAL 66

Published by NCC on behalf of the Department of Industry sponsored CORAL 66 Group

MICRO NEWS—2

Edited by Martin Banks

Inmos stress on single-chip

FURTHER evidence has come to light indicating that the NEB's fledgling semiconductor company, Inmos, is looking hard at single-chip microcomputers for its future product base, rather than the famed 64K RAM.

In an article entitled "The future of the microprocessor — a personal view," in the June edition of the quarterly Microelectronics Journal, Iann Barron, the UK's one-third of the Inmos triumvirate, writes at length on the way he sees the microprocessor developing.

He sees two potential, non-exclusive ways in which the micros may develop. One leads, through technology improvements, to micros containing far greater processing power. This might include the use of mainframe computer architectures such as the IBM 370.

The other way, about which he writes at some length, shows the increased storage capabilities of single chip microcomputers as being of great importance — a route currently pursued by Intel (see feature on facing page).

Unlike Intel, however, he feels that the inclusion of on-board peripherals such as A to D conversion will increase the application dependence of the devices. This will lose the concept of the "universal" microcomputer.

The addition of further peripheral functions may, he suggests, reduce rather than extend the market potential of microcomputers. A way round this which Barron points to is a possible move to "custom" processors, where the customer can specify the configuration of standard architectures, store and I/O functions.

Is this, perhaps, what Inmos is planning?

BARRON . . . . possible move to "custom" processors.

Talks on third 'arm' for French strategy

A THIRD possible "arm" for the French microelectronics strategy has emerged following talks between Matra of France and Harris Semiconductors of Melbourne, Florida.

The talks are about Harris' Self-aligned Junction-isolated CMOS technology, and envisage Matra setting up a new company in which Harris might take a small minority stake. Money would come from the French government for establishing a CMOS plant.

Self-aligned Junction-isolated technology is said to enable propagation times of 5 nanoseconds per gate to be achieved, and allows a gate density of 175 per square millimetre. It is particularly appropriate to military applications, a field where Matra is strongly represented, since it operates in the −55° to +125°C temperature range. Operating on a five volt power supply, circuits can function at up to 40MHz.

Matra already has a joint-venture company with another US partner, TRW. The company, Matra Informatique, is 45% owned by TRW, and markets Datapoint equipment, TRW point-of-sale and banking terminals, and GCS key-to-disc systems in France.

Growing impact of the micro in DP

INTEREST, both personal and professional, tinged perhaps with a touch of fear, brought out the DP people last week to attend the Institute of Data Processing Management's session on the impact and relevance of the microcomputer in data processing.

They came to hear a series of presentations from protagonists of both the microcomputer and mainframe, and to take the opportunity of some hands-on experience on six different microcomputer systems brought especially for the occasion.

The panel consisted of Robin Woods, a consultant and director of Isher-Woods, a personal computer shop that opened recently in Luton; Paul O'Grady of Micro Focus; Myles Pollock of Templeman Software Services; Conway Berners-Lee of ICL; and Dr Adrian Stokes of Langton Information Services.

In the chair for the session was Computer Weekly editor, Malcolm Peltu.

There was broad agreement between the panellists that the micro would have a growing impact on the activities of the DP department and its manager, though opinions varied as to how and where this might first become apparent.

O'Grady, the first speaker, pointed to the fact that the primary interest of DP people was in making effective use of their skills, which by and large revolved around programming in Cobol. With the introduction of software like his own company's CIS Cobol for running on micros, there was now the opportunity for DP people to work directly with micros in their own environment.

In addition, the combination of an Ansi standard Cobol with CP/M, an increasingly popular operating system for microcomputers, now meant that a high degree of software portability could be achieved, which in a business environment could have great significance to the DP department.

Support for O'Grady's view came from Woods, who said that there was now a tremendous opportunity opening for the DP department. This was not without its responsibilities, he said, especially in overseeing the use and implementation of such equipment.

In response to questions on maintenance, he said that it was not too bad. In one respect some manufacturers were almost second sourcing, like the semiconductor industry, with plenty of alternate manufacturers of sub-systems and components around. In another respect, even the cost of buying a complete spare system, say £3,000, could be viable if this meant downtime was kept to about one or two hours. "Not even IBM can always achieve that," he said.

From the mainframe manufacturers' point of view Berners-Lee could see a big role for microcomputers, but mainly in a subservient role.

He pointed to the submission to the American FCC by Bell that, if approved, would take the public carrier much nearer to the user, with Bell handling all protocols. At the user level, much of the hardware would be micro-based, he suggested, but he saw such hardware generating vast amounts of transaction traffic.

Systems show in Sweden

NEXT in a growing round of European exhibitions and conferences on microcomputer systems is to be held in Sweden, at the end of November.

The Microcomputer Systems show is to be held at the Svenska Mässan Stiftelse in Gothenburg, between November 28 and December 2, and an impressive line-up of exhibitors have already booked space at the show.

These include Zilog, Compucorp, Trivector Systems, Texas Instruments, Motorola, Altair and Rair.

Further information can be obtained by writing to Box 8222, S-402 24, Gothenburg, Sweden.

Intel pursues its own line

● From page 14

edge in the low-cost controller marketplace.

Miller, based at Intel's Santa Clara 4 facility, points to several areas where developments in the capabilities of the product would continue to give the necessary advantage. His suggested scenario of developments starts with a continuing expansion in the amount of program memory included on the chip, followed by an expansion of the data memory capability.

But the area that will probably get the most attention in the future, Miller suggests, is that of I/O capability. In particular, he sees increasing attention on providing much highter voltage and current driving capabilities directly from the chip.

Such a move would obviously be aimed at reducing the number of peripheral circuits that are currently required to produce system hardware for even small controller applications, with the eventual objective being the production of the true single chip system.

To some extent, this philosophy has already been put into effect with the 8022, a member of the 8048 device family. A derivation of the 8021 part, the lowest cost/least performance variant which is already a $3 part when bought in volume, the 8022 already incorporates several of these points. The program memory has been doubled, to 2K bytes, and the interfacing has been designed to be flexible enough to cope with odd voltage ranges, such as those found with touch panel keyboards (thus allowing direct data entry). Perhaps its most significant capability is the inclusion of an on-board analogue to digital converter. This, according to Miller, can reduce the parts count in customer systems by ratios of between 7:1 and 20:1.

Following the cross-licensing agreement with RCA, through which RCA gained the right to produce 8048 parts in its CMOS process, Intel is itself looking closely at the market for low power devices, which the RCA part would be. In return for the design rights to the 8048, RCA has provided Intel with technical information on CMOS processing, and according to Miller, Intel is finding that the potential market for CMOS 8048s is beginning to look attractive. No final decisions on whether to make a move into this market have yet been taken, however.

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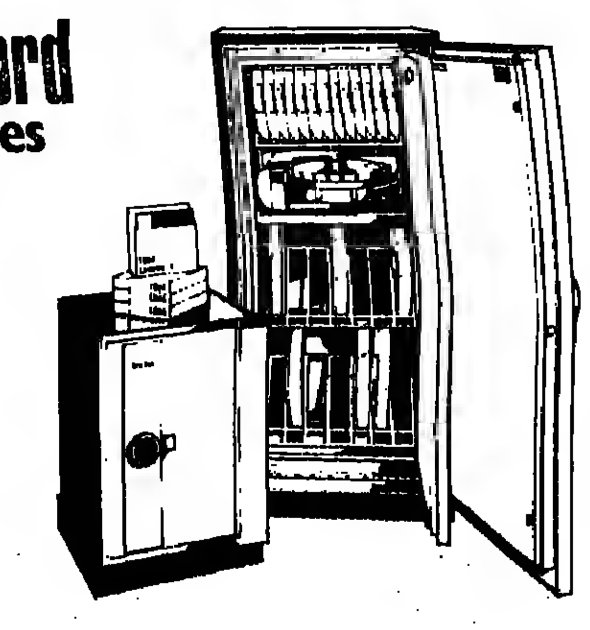

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Scicon turns to universities

THE growing number of computer science courses offered at UK universities is having a significant effect on the recruitment policies of at least one major UK employer.

Scicon reports that it has largely ceased recruiting experienced staff, and instead combs the universities for computer science graduates, citing Edinburgh and Loughborough as sources of high-class graduates.

"The people we are getting from the universities now are able to do useful work for us from the day they join," a Scicon spokesman told Computer Weekly.

Specialist group for database users acts as a forum

THE Specialist Group for Database Users is one of the newest within the BCS. It was formed in March of this year and officially recognised by the society only in September. The group acts as a forum where users of database and teleprocessing software packages may get together to discuss common problems.

Until the formation of this group the only means users had of exchanging ideas, and of discussing problems, was within the user associations of their particular software vendor, whereas problems associated with databases are often common to different systems.

Of particular interest to members of this group are aspects of data administration, the use of data dictionary systems as an aid in this work, and the various techniques available for data analysis.

The group meets six times a year, on Wednesday afternoons at University College, London, and the average attendance of about 45 is proof of the need for such a group. It is planned in 1979 to publish papers based on the presentations given by the speakers at the meetings.

Speakers for the coming session include Trevor Sankey, of the Institute of Oceanographical Sciences, who will

The author, Geoff Baker.

describe an application which stores its data definitions as part of its database. New data types can be defined, stored in the database, and reported on without the need to produce any new programs — complete data independence.

Other guests will be Tom Gilb, independent consultant and a regular contributor to Computer Weekly, who will present his personal view on the use of generalised database software products; and Roger Claxton, of the Manpower Services Commission, who will describe various techniques used to prevent certain users from accessing and/or updating certain parts of a database.

Two meetings in early 1979

79

21

Bloomsbury Centre Hotel & Institute of Education London WC1

This is the second in a short series about the BCS Specialist Groups. Geoff Baker, of CACI International, outlines the activities of the Database Users' Group which is one of the latest to get BCS recognition. With other groups, the database people will be taking part in the BCS 79 Living with Computing conference and exhibition which is to be held in London from January 4 to 6 next year.

will be dedicated to the discussion of the various data analysis techniques which may be used by data administrators and there will be sessions on specialist database techniques and on data dictionary experience.

Further information about the group can be had from Geoff Baker, CACI Inc International, 289 High Holborn, London WC1V 7HZ. Tel: 01-405 8234.

At BCS 79 the group's first speaker will be Brian Davis, an independent consultant, who will be putting the database into perspective. He will discuss the state of the art and look at what is being achieved by the use of database software. He recognises the major problems of deciding at what stage the risks associated with a new technique become acceptable — adventure too soon, you may be pioneering, if you leave it too long you may forgo substantial benefits.

I will be discussing "The Database Approach." Data is as valuable a resource as any of the other resources an organisation possesses. If an organisation loses its list of customers, the effect can be as catastrophic as a fire. It is essential that the organisation of the data be centrally controlled by a data administration function.

Finally, Mike Hibby of STC and vice-chairman of the BCS Data Dictionary Working Party, will describe "Living with a Database." He will review the first two years in the life of a large database containing all the manufacturing data of a company.

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Voice response system speeds Toyota orders

VOICE response terminal equipment from Menzies Communications Systems of Comberley will enable Toyota GB to save three hours on urgent orders and give dealers a check on their order entry.

The £90,000 system replaces an Ansafone and Seecheck system.

Dealers will send order information via a Periphonics keypad acoustically coupled to a dial-up telephone line to the voice response system. The order is processed on Toyota's ICL 1902T computer and a recorded voice message is assembled and played back to the dealer confirming the details of his order or telling him if the item is out of stock.

Menzies recently switched to Periphonics systems from Wavetek, because it said they were more flexible.

Both systems come from the US and Wavetek systems are now marketed in Europe by Racal-Milgo (CW, August 10).

Rockwell splits into three

TO promote growth in its bubble memory products as well as other technology areas, Rockwell International is restructuring its Microelectronic Devices business into three sectors: bubble memory products, device products including MOS LSI and gallium arsenide devices, and telecom/subsystem products including LSI modems.

First of many

FIRST production configuration of the £300,000 Nord computer system for the General Dynamics F16 flight simulator has been completed and is soon to be delivered. The first of an initial order for 18 systems, it consists of five processors

Words of warning to systems architects

I WISH to reply to Tom Gilb's excellent question "Who is ready to put 'architect' on his calling card?" (CW, October 5), by pointing out that we already have done so for the past six years. Our company name, Software Architects, was in fact second choice because the Registrar of Company Names disallowed "Systems Architects" on the grounds that it was more suitable for a construction company specialising in system-building (ie of high-rise flats).

In view of the demise of this technique after Ronan Point, perhaps it's just as well we didn't adopt that name after all!

In any event, the computer industry in the UK is by no means the leader where the work has been done at Lancaster, Sussex, and the Open University, and in industry generally, concerning the application of the total Systems Approach to problem identification and solution in many fields.

One of the crucial points that has emerged is the consistent manner in which systems break down at interfaces. Ronan Point happened mainly because of the failure of fixings at three dimensional joints under unforeseen stress.

A word of warning therefore for all budding computer systems architects. A true systems architect needs a plethora of wider talents: psychology (to motivate users); ergonomics (to design an acceptable man-machine interface); the intellect and inquisitiveness of a lawyer (to perceive root problems rather than symptoms), to name just a few. These are in addition to the normal computer expertise.

The situation is different in the US, since you have to be able to do more than merely write ledger program specs to call yourself a system analyst or systems engineer.

So, I would like to supplement Tom Gilb's question to his readers with my own: "Have you identified and queried every implicit assumption?; and are you sure the answers do not cause a bigger problem at an interface or elsewhere? If you can answer "Yes" to all these, then you'll be doing your users and yourself a big favour.

Only then should you put the words "Professional Systems Architect (Computer)" after your name!

TONY FRIEDLANDER,
Manager, Systems Division,
Software Architects Ltd,
London.

LETTERS

Intuition: Why IBM presumes too much

IBM has recently had a number of full-page advertisements in the national press, apparently designed to calm public disquiet about computers. In one of these they make the claim, "No computer will ever be able to take decisions based on intuition," and I am prompted to wonder what makes them so sure?

One can of course define intuition as a purely human attribute, but this begs the question, since we now have to ask, "Is it possible for a computer to take decisions which, if taken by a human being would indicate use of intuition?", and the answer to this must be "Why not?"

One dictionary definition of intuition is "Immediate apprehension by the mind without reasoning," which sounds very like public look-up.

More seriously, the essence of intuition is surely the absence of conscious reasoning. When we use intuition we depend on our store of information about the world in general and the given situation in particular, and presumably there is an elaborate process of associative searching which leads to the final decision. Present technology of hardware and software may not be capable of this, but there is nothing fundamental about computers to stop them behaving like this.

If IBM wants to announce that none of its computers will ever take decisions based on intuition, that is its business. But I wish it wouldn't presume for the rest of us.

D. W. BARRON
Southampton University.

Low-cost version Gamma's Proteus

A LOW-COST version of Gamma Computer Products' top-of-the-line Proteus system has been introduced, offering users a complete disc-backed microcomputer system for £12,400.

The Proteus consists of a DEC LSI-11/2 microcomputer with 64K bytes of memory, 12-line, 40-character plasma display, 60 cps, and the new version comes with two DEC RK05-compatible 5 Megabyte cartridge disc units. The more expensive Poseidon, already available, has 15 Megabytes of fixed and 5 Megabytes of exchangeable disc storage and costs just over £16,000.

The Proteus is the top model in Gamma's Olympic range of LSI-11-based microcomputers, which are marketed in the UK under licence from General Robotics of Hartford, Wisconsin.

The other models are the Triton, which offers double-sided double-density floppy disc storage, and the desktop Proteus, which includes processor, plasma display, printer and three mini-floppy drives in a single unit.

Markets identified for the Olympic range include education and research, hospitals and large, multi-site commercial customers, particularly in retail and distribution trades.

Gamma has a wide range of system and application software available, including its own proprietary NET-11 real time timesharing operating system, with Dibol and Basic support. Most of Gamma's application software is written in Dibol, the proprietary DEC business language.

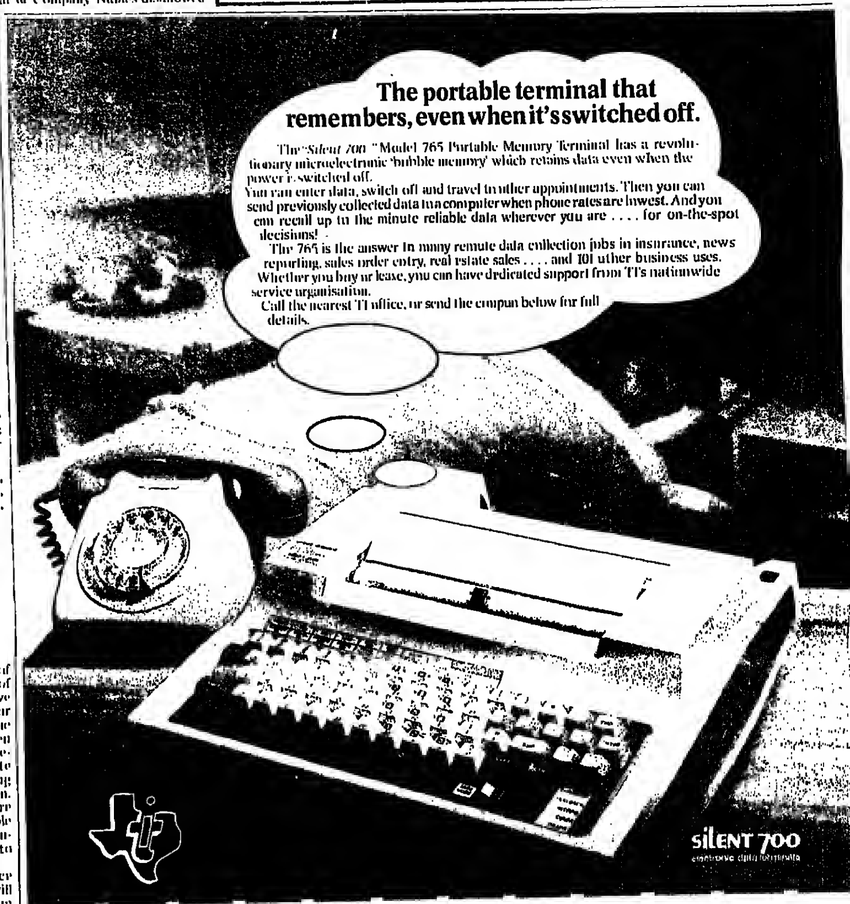
Gamma has achieved something of a coup with the installation of the first Proteus system in France. The customer is Info-Service SA of Orsay, which is using the Proteus for software development.

Gamma Computer Products of Wokingham, Berkshire, is a member of the Nottingham-based Gamma Associates group.

Dealing with other people...

A COURSE intended to help computer people deal better with others, both outside the DP department and within, is being run by BIS Applied Systems on October 31 to November 2. Called "Interpersonal Skills — Transactional Analysis," the course will use televised case studies, workshops, and role playing to help managers improve productivity through "an understanding of how people at work react to one another, their attitudes and motivations, especially as expressed in personal communications."

The two-and-a-half day course will be held in London and will cost £235, including overnight accommodation. Further details can be had from Jackie Collings on 01-633 0868.



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Post Office Telecommunications has solved the problem with a suite of computer programs developed at the Post Office Data Processing Service. A year's trial in the Midlands Telecommunications Region showed a saving of £30,000, and now the system is to be extended to cover all 9,000 telecommunications buildings.

As a result, the Post Office expects to save £280,000 annually on its telecommunications electricity bill.

The Post Office Data Processing Service is presently equipped with four Leo 326 computers, a 2970 and a System 4/72, all from ICL.

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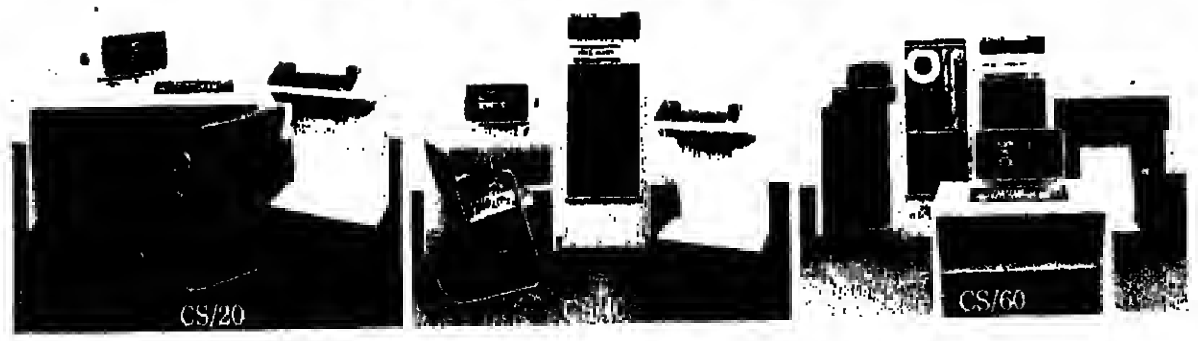

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Netcom to give DoE flexible access to 1900s

MORE than 70 teletype and batch terminals in Department of the Environment offices in the South of England will be able to access any of three ICL 1900 series computers at its Hastings computer centre through a Netcom communications processor from Systems Reliability, the Luton-based maintenance and engineering firm.

The Netcom is a protocol transparent device which will accept signals from terminals in London via a Racal time division multiplexer at DoE Marsham Street headquarters and separately from batch terminals in Bristol, Croydon and Hemel Hempstead, where activities include collecting construction industry and road accident statistics to be stored and processed at Hastings.

The Netcom routes the data from up to 50 incoming lines via a patch matrix to a pair of ICL 7930 line scanners which feed a 7903 processor front-ending a 1906A mainframe, as well as another 7003 and a Digico M16 which front-end two 1904S mainframes.

It functions as a contention unit, giving back a "busy" message, or it can store and forward messages when a calling terminal cannot be connected to a mainframe.

The £70,000 contract includes the Netcom, the multiplexer, modems and the patch matrix and the DoE expects the equipment will save about £40,000 a year, largely on Post Office costs.

Data link delay continues

A DATA link delayed by the Post Office Engineering Union's industrial action (CW, July 20), which ended in August, is still held up. The link is over a leased line from London University Computer Centre to University College to enable the centre to talk to Cambridge and Newcastle University computers through a protocol conversion facility at University College. ULCC cannot use a dial-up line because University College only has one dial-up connection and so cannot link to ULCC and Cambridge at the same time.

The new line was installed during the POEU action, but has not been connected because paperwork was not completed at the time, according to Neil Williams of ULCC Service Development Department. The Post Office is unable to give a date for connection.

£½m Prime order

ITS biggest yet order outside the US has been received by mini maker Prime for a dual model 500 system to provide interactive computing for Wolverhampton Polytechnic. This £500,000 system will replace an ICL 1903, and thus the Poly is joining the swing away from mainframes towards minis at educational establishments (CW, March 23).

Wolverhampton Poly's computer courses are expanding rapidly and its present split of 70% batch work, 30% online is expected to reverse when the Prime system, capable of supporting 64 terminals to start with, has become established.

Later, up to 96 terminals will be usable at once.

Each of the interlinked 500s will have 1.5 Megabytes of memory and 600 Megabytes of disc. The interlinking will mean that users connected to one processor will be able to access files on the other's disc with no difficulty. The whole will run under Prime's own Primos 5 virtual memory operating system.

Most of the terminals used will be ordinary VDUs, but some will be graphics terminals. In addition to student users, administrative and library staff will be using the system.

Database power

● From front page

offered include a data dictionary and a librarian.

Conversion facilities for upgrading from System 3 are offered, and System 38 can be used as an SNA terminal to a 370 mainframe.

Two processors are offered, cycling at 1,100 or 600 nanoseconds, and main memory expands from 512K to 1.5 Megabytes. The smaller model uses 64K bit memory chips and the larger 32K bit chips.

CPU, disc, floppy disc magazine and the operator console are integrated into a single unit, and the Model 3 is field upgradable to a Model 5.

Software is available only on monthly rental. A system with four displays, two terminal matrix printers and the basic system line printer, 512K memory and two discs, costs £83,000. With 40 terminals, 1.5 Megabytes and six discs it would cost £330,000. Deliveries begin in the last quarter of 1979.

Amdahl upgrade

■ From front page

making the V/8 marginally cheaper than IBM's 3033.

The V/8 is substantially more powerful than the IBM 3033.

Amdahl rates the V/8 at 1.2 to 1.3 times as fast as the V/7 when running interactive, high supervisor state workload like airline reservations. Against the IBM 370/168-3, Amdahl rates the V/8 at 2.75 to 2.95 times faster, and taking a 3033 as 1.8 times a 168-3, this suggests that the V/8 is 1.63 to 1.64 times a uniprocessor 3033 and probably equivalent to a multiprocessor 3033 — which is double the price of the single processor version.

Deliveries of the V/8 begin next September, and field upgrades of V/7s will take one day or less and cost £150,000.

The new 470V/5-II model, available in January, doubles the buffer capacity to 32K bytes giving 10% better performance than the existing model. The V/5 and V/6 models have all been reduced in size by the use of more compact 4K-bit memory chip boards.

● Amdahl has also announced another record quarter of turnover and profits. Net profit for the 1978 third quarter was up 100% at $12.8 million on turnover up 83% at $85 million compared with the same period in 1977.

VME/B switch

THE Central Electricity Generating Board is to transfer all its VME/B work to its partly-owned 2976 from [illegible] existing VME/B 2960. The latter is being converted to a DME machine in order to provide DME facilities to outside users. Computel already has one DME machine which [illegible] running the workload [illegible] bureau [illegible]

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RELATIONAL DATABASES

By Max Stewart — Part 1

In this, the first of a 10-part tutorial series on databases and structured file design, Max Stewart sets out to show that these techniques are not obscure state-of-the-art theories but methods that down-to-earth systems designers should be using. Stewart, who is divisional technical support manager for Leyland Vehicles, the commercial vehicle division of BL, shows there is no need for the mathematical jargon and abstruse notation often used by some proponents of relational databases.

THE object of this series is to introduce relational database principles which can be applied in practice both to conventional file design and to database design while avoiding the theoretical complexities which are the purists' delight. The exposition is a personal one, and — in the interests of getting the message across — liberties have been taken with established nomenclature.

File and database design only is covered; relational data manipulation languages form a separate topic and one over which the systems designer (as opposed to the database management system designer) has little control. Given sufficient interest this may form the topic of a future series.

Basic Ideas. If you are a systems designer, you probably use relational database concepts unknowingly. For example, Des, our enterprising systems designer, has six data items with which he must construct one or more files:

CAR-REGISTRATION NUMBER
CAR-COLOUR
YEAR-OF-REGISTRATION
EMPLOYEE-NUMBER
SEX
GROSS-PAY

He automatically groups them thus:

File 1 (car file)	File 2 (personnel file)
CAR-REGISTRATION NUMBER*	EMPLOYEE-NUMBER*
CAR-COLOUR	SEX
YEAR-OF-REGISTRATION	GROSS-PAY

where the key fields for each file are asterisked. Why does Des group them in this way? Because he feels instinctively that:

- Each key field should represent an object, and that a value of a key field should uniquely define a particular object (eg XYZ123 represents one and one only record in the car file).
- Each field which is not a key represents some attribute of the key (eg SEX is an attribute of an employee who is uniquely identified by EMPLOYEE-NUMBER).
- The clustering of a key field and associated attribute fields in each of the files is inherently stable: Cars may sprout wings, for example, and WING-SIZE may be added to the car file; a new Equal Opportunities law may cause SEX to be removed from the employee file; but the likelihood of ever having to move CAR COLOUR from the car file to the employee file is rather remote.

Putting intuition on paper. Des's intuition has taken him a long way. The other members of his team do things in more or less the same manner but sometimes come to blows over the repercussions of enhancing existing systems.

Des is adamant: "If you'd designed it my way you wouldn't have been forced to move so many fields from one file to another." The retort is always: "We've heard it all before; what exactly is your way?"

And this is where Des starts to waffle. He knows that his design technique is basically sound but he is at a loss to explain precisely what he does and why.

Relational design principles. The principles Des uses can be derived from a concise and generally straightforward technique which we shall call relational design. Because data items are clustered into files using rules which refer only to the meanings of the data items concerned and the relationships between data items, the resulting file structure is independent of any file handling package, database management system or computer manufacturer.

This file structure may subsequently be modified to suit its intended applications, but the modifications tend to be easy to implement because the initial logical file structure is simple to understand.

Two characteristics of files constructed on relational principles ("fourth normal form" files) are:

- Each file has a linear structure (i.e. no repeating groups)
- Non-key fields in a file are attributes only of the file key and not of each other.

The ways in which relational files can be created are best illustrated by example. This example will be referred to frequently in subsequent articles, and readers are advised to keep it for reference.

Example. A conventional (but badly designed) file is shown in Figure 1.

A warehouse stocks many items and each item is uniquely identified by the value of ITEM. Each item is described by a DESCRIPTION, and it is possible for several items to have identical descriptions. QTY-IN-STOCK is the quantity of each item currently in stock. A customer is uniquely identified by the value of CUSTOMER, and he places all his orders through one SALESMAN.

At each visit of his salesman, a customer may order several items. An order is composed of sub-orders (order lines), each sub-order being for a quantity QTY of a particular item. The customer can make repeat orders for an item, but cannot make more than one sub-order for a particular item in any one order. Each order has a unique ORDER-NO.

In Part 2 this example of a conventional file will be used to examine relationships between data items and see how such relationships naturally lead to the definition of a key and the idea of dependency upon a key.

ITEM DESCRIPTION	QTY IN STOCK	ORDER NO	CUSTOMER	SALESMAN	QTY
Keg Steel	300	1	Ortny	Joe	12
		2	Spumnn	Jack	20
		3	Eversoft	Jock	6
Bung Steel	10,000	4	Crudgington	Jock	1000
		5	Fuddle	Jim	500
Top Brass	300	2	Spuman	Jock	20
		4	Crudgington	Jock	10
		8	Spuman	Jack	30
		7	Orotny	Joe	80

Figure 1

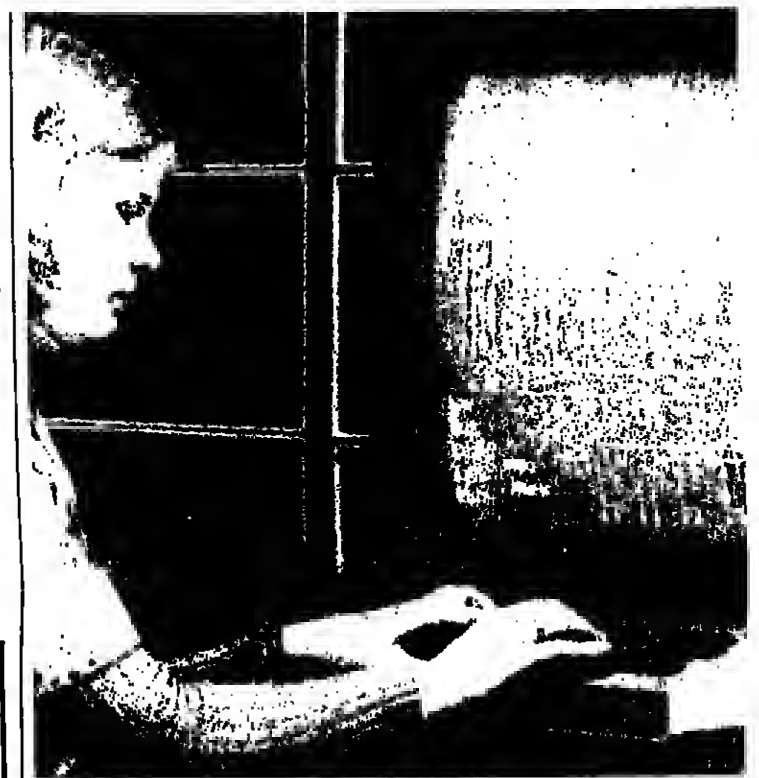
Texas adds a DBMS on 990

EXPANDING its offerings for the OEM systems builder, Texas Instruments has added a proprietary database management system on its DS990 line of packaged TI 990 minicomputers.

The system, called DBMS 990, was written in Pascal, and is described as being similar to Cincom's Total system. An RPG II similar to that on the IBM System 3, Cobol, Fortran IV and Pascal are also available.

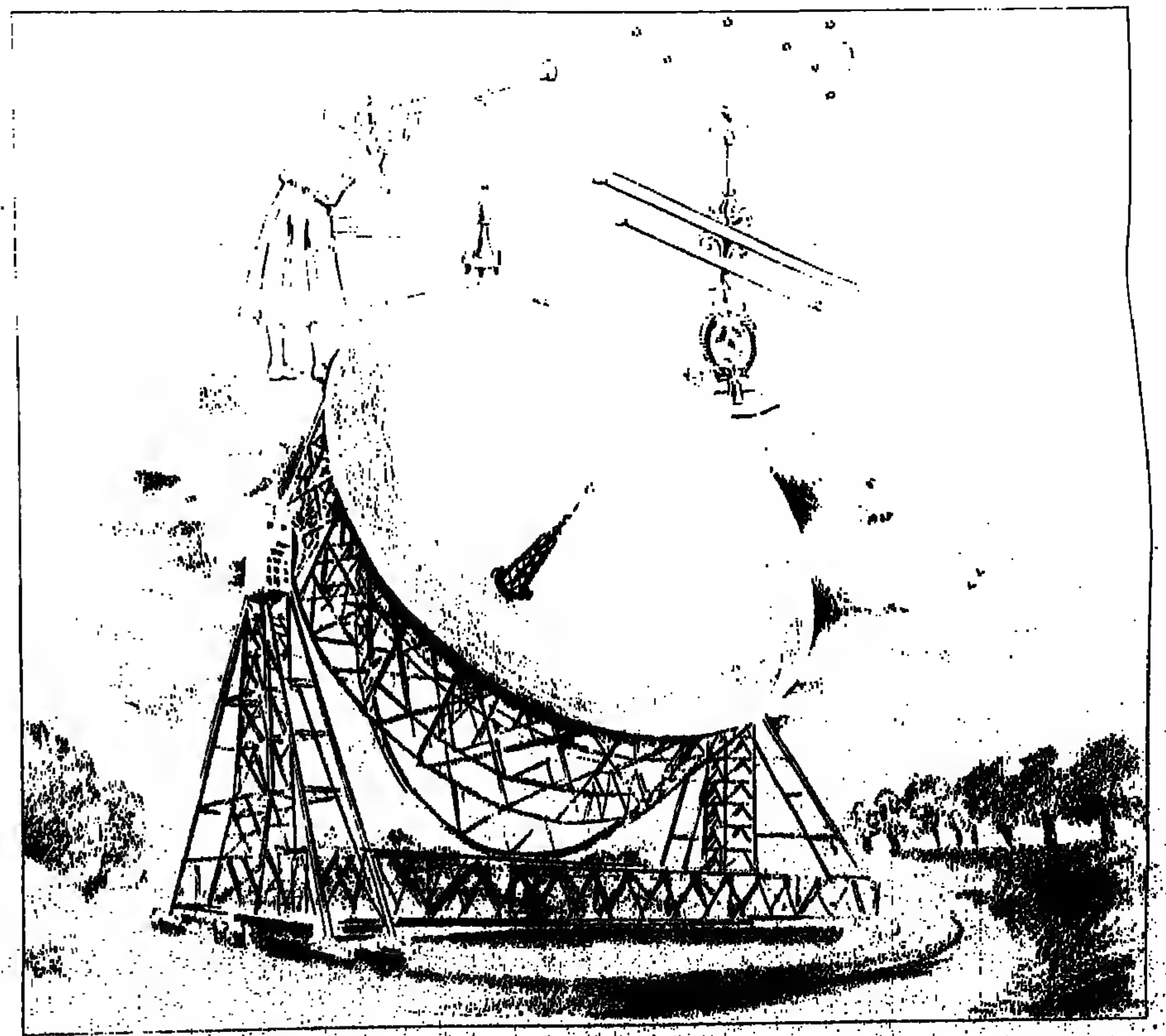
CMG packages aid group

INTERNATIONAL construction group French Kier Holdings is now using a computer service provided by Computer Management Group (Middlesex) to handle the administration of its pension scheme and payroll. Based on the CMG Payfact payroll and Compers pension scheme packages, the French Kier system is expected to reduce the complexity and time taken [illegible]



MONITORING and controlling networks that distribute commodities like gas, electricity, oil and water is one of the main application areas for the Digital Equipment VTV30-H colour display system which can interface with a studio standard colour television monitor like the one shown here.

The VTV30-H, which is now being sold in the UK by Dicoll Electronics of Basingstoke, is an eight-colour system and works in conjunction with a DEC LSI-11 minicomputer. Other features include 128 programmable characters and 625- or 525-line operation. Other application areas include flight simulation, manufacturing plant management and engine testing.



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Key questions on AT&T's Advanced Communications service that remain unanswered

By Morris Edwards

NOW that the initial details of AT&T's Advanced Communications Service have been released, some of the speculation over what was planned with Bell's new data-oriented transmission service has ceased, says US-based consultant Morris Edwards. But some key questions remain unanswered.

Here he looks at the outline plans for ACS — and at some matters for the suspicious and quizzical alike to puzzle over.

R the past 18 months, the US a communications community has been abuzz with culation over what Ma Bell planning with her new data-ented transmission service.

ow that initial details of &T's Advanced Communica-s Service have been ased, some of the specula- has ceased. However, key stions concerning tariffs and ware support, for instance, ain unanswered.

What is more, the AT&T ument outlining its plans for has raised another matter he suspicious and quizzical e to puzzle over; namely, should AT&T announce a ice that seemingly copies t is already available from e-added carriers today, the service may not be able until 1983?

n it be that AT&T is con-ng its policy of duplicating peltive equipment and ser-that catch on with users?

at policy was evident in the 1970s when Datran on-ced its plans for a digital smission service. In res-e, AT&T did a speedy and plete turnaround from a ion of no interest in the market to pushing through, double-quick time, its phone Digital Service.

ced with competition nst a facsimile of its own ce, and with what it claimed predatory pricing by AT&T, ran subsequently went rupt.

lowise, it was the indepen-nous Bell firms which plon-d modern developments as 9,600-bps units, diag-ic aids and devices capable erating full duplex at 1,200 over dial-up lines. Now Bell s all these capabilities.

ACS a similar ploy by AT&T apitalise on the success that net is finally enjoying after gling through the difficult lopment period?

he word out of AT&T's headquarters in Basking Ridge, New Jersey, is that the old mode of reacting to market developments has given way to a new market-driven organisation that anticipates customer needs and satisfies them.

Before introducing ACS, AT&T claims to have embarked on a major project to gain "a better understanding of the composition and size of the overall data communications environment."

To do this, AT&T says it studied over 2,000 users of data communications from all economic sectors of industry, education and government, and conducted "in-depth interviews with decision-making personnel of some 65 major data communications users in 23 industry segments."

What AT&T found was that users face four types of problems in implementing and operating their data communications systems:

1. Users have tended to develop a separate network for each purpose or application, resulting in incompatible and underutilised networks;
2. Users often have difficulty in modifying existing networks to accommodate changing requirements;
3. Users are finding that the task of managing multiple networks, including the monitoring of their performance, is becoming an expensive and time-consuming burden; and
4. Data communications systems often have start-up costs that are too high to justify their use by smaller users or their deployment by larger users for applications that do not support substantial expenditures.

AT&T's Advanced Communications Service addresses the compatibility problem by providing code conversion, protocol translation and speed matching so that diverse terminals and computers can communicate freely, and a single terminal can access multiple applications over a shared network.

Flexibility is achieved by offering users a broad set of data communications capabilities from which to select standard features. Users may also define customised features depending on their application needs. In this way, ACS is meant to assure users that their data communications investment will remain usable in the face of rapid expansion and changing technology.

availability is clouded by regulatory, legislative and even judicial considerations; so no one knows for sure when, or even if, the service will become operational.

AT&T's schedule calls for tariffs to be filed by mid-1979 and for three nodes to be in place by year end, growing to 100 nodes by the mid-1980s. In view of the opposition ACS faces at the Federal Communications Commission, that schedule is glaringly optimistic.

At the best of times, the FCC would have difficulty approving the service in under 18 months. As it is, these are perhaps the worst of times for the FCC, which recently took on a new chairman, and also lost the two top people from the bureau that advises the Commissioners on matters such as ACS. At the same time, the FCC is under attack from Congress, which wants to replace it with a more streamlined and limited body, and from the new National Telecommunications and Information Administration, which appears ready to second-guess the FCC on key policy issues. In the algorithm that describes how Washington functions, all these uncertainties translate into additional delays for approval of ACS. The best guess is that ACS will not be available as a substantial service until 1983 at the earliest.

As for the relationship between ACS and the integrated voice data video facility, this could be a clue to AT&T's intentions with regard to the new service. In examining these intentions, one must remember the vast investment AT&T has in the leased lines that make up existing private networks.

For that reason, it is understandable that AT&T projects limited revenues from ACS in the first few years of operation.

AT&T's game plan calls for ACS to attract small users who don't have an existing private network, large users who want to supplement private networks with an application or two involving limited data traffic, and users who want to communicate on an inter-company basis — something difficult to do with existing private networks because of their incompatibility.

In its document on ACS, AT&T underscores the fact that the new service will ease a user's transition from a private network. Other points made incidentally in the document, but which may loom large some day, include the fact that AT&T will supplement ACS with circuit-switched service if the demand exists, and that "ACS is designed to be adaptable to improvements in network technology without impacting user application programs or terminals."

Can it be that ACS is purposely limited in scope, serving as a trial balloon or a precursor to a much grander service waiting in the wings? It certainly makes sense logistically for AT&T to start with a limited packet-switched offering, since implementing a nationwide network service capable of accommodating a wide variety of mainframes and terminals is a mammath undertaking, especially in the areas of software development and support, which are not traditional strengths of AT&T.

With a slow build-up of customers on ACS, AT&T could "get the bugs out" of the network service without too much disruption. Then, AT&T could add capabilities to ACS in a manner completely transparent to the user.

What kind of capabilities might be added? One likely possibility is the integration of voice, data and perhaps video, traffic on the network a la Satellite Business Systems, leading ultimately to the "information utility."

The use of the world "utility" comes from the fact that, just as you plug an appliance into an electrical outlet to draw power so the information utility allows you to "plug in" terminals — whether typewriters, facsimile machines, teleprinters or video display devices — to tap a wide variety of information sources.

Another key part of the utility concept is pricing based on usage — an element already present in value-added carrier services. As the distribution facility for the "information age," such a utility could have as much impact as railroads and canals had on the Industrial Revolution.

What does all this mean for the business user? First, in the short term users in the US should not hold their breath waiting for ACS. A good strategy would be to keep ACS in mind as a possible option for future applications, but not to delay any present plans in anticipation of it.

Secondly, in the long term, users should start looking beyond their data processing horizons to see how their organisation's total information needs might best be met.

Already SBS has done quite a bit of groundwork educating US executives to the opportunities afforded by a quasi information utility, and AT&T is committed to a similar effort. As a result, DP managers might soon find additional funds at their disposal to explore alternative communications services, and also greater accessibility to the executive suite.

> ***It all sounds so much like motherhood and apple pie that one is tempted to wonder if there is a worm in the apple. In fact, there may be several.***

ACS attacks the third problem area, network management, by providing users with information on the status, usage and performance of their particular "subnetworks." Finally low entry threshold is achieved by allowing a gradual phasing of applications on to ACS, avoiding the high start-up costs normally associated with developing and implementing data communications systems.

It all sounds so much like motherhood and apple pie that one is tempted to wonder if there is a worm in the apple. In fact, there may be several.

For one thing, many of the compatibility, flexibility, network management and low entry threshold features are available from today's carriers. For another, ACS appears at odds with the AT&T philosophy of integrating voice, data and video information into the same network. Finally, how valuable will ACS be to users five or more years hence?

Of course, the question of ACS

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The required qualification is sound experience in a commercial programming environment, probably gained from at least two years in programming. The installation is based on an IBM 370/148 computer which is due to replace the existing IBM 360/40 computer in December.

Initial salary will be up to £5,500 according to experience, together with other fringe benefits including BUPA and relocation expenses where necessary.

So if you're looking for a better job, that offers a great future, then make the move to Kimberly-Clark and share in our success.

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2900 COBOL Programming Staff £4-8K-London

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The Government Services Department at Dataskil urgently requires programming staff at all levels to work on large sophisticated 2900 projects using IDMS and TP in and around London.

If you have a minimum of 1 year's 2900 COBOL experience, then talk to Garry Grundy on Reading (0734) 581258 to discuss these opportunities further. Alternatively write to him, with brief details of your experience, at ICL Dataskil, Reading Bridge House, Reading, Berks RG1 8PN. Please quote reference C1046.

In addition to the basic salaries the men or women we appoint will enjoy a range of fringe benefits and relocation assistance will be available in appropriate cases.

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Systems Programmer

Applications are invited to assist in the installation, maintenance and development on the Polytechnic computers which include a DEC-20, 11/40 and a Data General Nova.

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Salary £4461-£4761 plus supplements of £312 p.a.

Further details and form of application available from The Assistant Director and Chief Administrative Officer, Trent Polytechnic, Burton Street, Nottingham. Closing date: November 6, 1978.

TRENT POLYTECHNIC NOTTINGHAM

This progressive Company, manufacturing electric road vehicles and industrial trucks, urgently requires an experienced

PROGRAMMER/ANALYST

To manage and develop systems on an on-line mini computer installation in South Wales

Salary offered C £5,600.

Apply in writing to —

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SYSTEMS ANALYSTS

Prestwich, Manchester **£4,959-£6,025**

The North Western Regional Health Authority requires Systems Analysts to work on a wide variety of systems, both batch and on-line. The option of shift working is available for some of these posts for which an additional emolument will be paid.

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Starting salary will be commensurate with experience in the range £4,959-£6,025 per annum.

The Computer Centre, which affords a pleasant working environment in new premises, is within easy access of the M62 motorway (Exit 17) and convenient for local bus and train services.

Excellent conditions include staff restaurants, recreational facilities, sports and social club, a free car park, a choice of starting times and in certain cases assistance with removal expenses.

Leave entitlement consists of 20 days plus the normal statutory and other concessionary holidays.

Application forms and job description, etc. may be obtained from the Regional Administrator, North Western Regional Health Authority, Gateway House, Piccadilly South, Manchester M60 7LP, telephone number 061-236 9456, Ext. 425. Closing date 10th November, 1978. Please quote reference number 1658A.

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North Western Regional Health Authority Prestwich, Manchester COMPUTER CENTRE

Computer Programmers

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A challenging assignment worth at least £19000 tax free per two year contract

The operation and maintenance of a sophisticated air traffic control programme is an important aspect of Lockheed Aircraft International's activities in Saudi Arabia, and the challenge offered to experienced personnel is, therefore, considerable.

Additional programmers are required to carry out a wide range of work relating to computerised support systems. The essential requirements are sound experience of LEC or IBM System 3, plus RPG II together with some knowledge of FORTRAN, COBOL and/or machine language. Business experience, ideally in inventory control, personnel records, flow charts, etc. would also be advantageous.

With the recent increases in salaries and benefits, Lockheed are now able to offer a salary of at least £7341 per annum tax free for a two year contract plus —

* A bonus payment of £500 every six months culminating in an end of contract bonus of £2500, totalling £4000.
* Cost of living allowance of approximately £200 pa., paid monthly.
* Three paid leave periods with three free flights home to the UK annually.
* Free food, laundry and bachelor accommodation.
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There are excellent prospects of employment beyond the contract period, and the positions could be accompanied, although terms and conditions will vary from the above.

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Write or telephone for an application form, quoting Ref. 751 to IAL Limited, Aeradio House, Hayes Road, Southall, Middlesex. Telephone: 01-574 5000.

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TEXT PROCESSING

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For application form and further details write to Graphical Software Limited, 5 Salisbury Villas, Station Road, Cambridge, or telephone Michael Etherton, 0223 58111 (day time) or 0223 56380 (after 6 p.m.).

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Up to £4,683 p.a.

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Application forms from Personnel and Management Services Officer, London Borough of Greenwich, Peggy Middleton House, 50 Woolwich New Road, London SE18 6HQ (Tel 01-854 8888 Ext. 2119).

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Salary will be at an appropriate point on the Range IA scale £3,883-£6,555 p.a. according to age, qualifications and experience. Membership of the appropriate University superannuation scheme will be required.

Further particulars may be obtained from the Registrar, The University, Newcastle upon Tyne NE1 7RU, with whom applications (3 copies) together with the names and addresses of three referees, should be lodged not later than 17th November 1978. Please quote reference CW.

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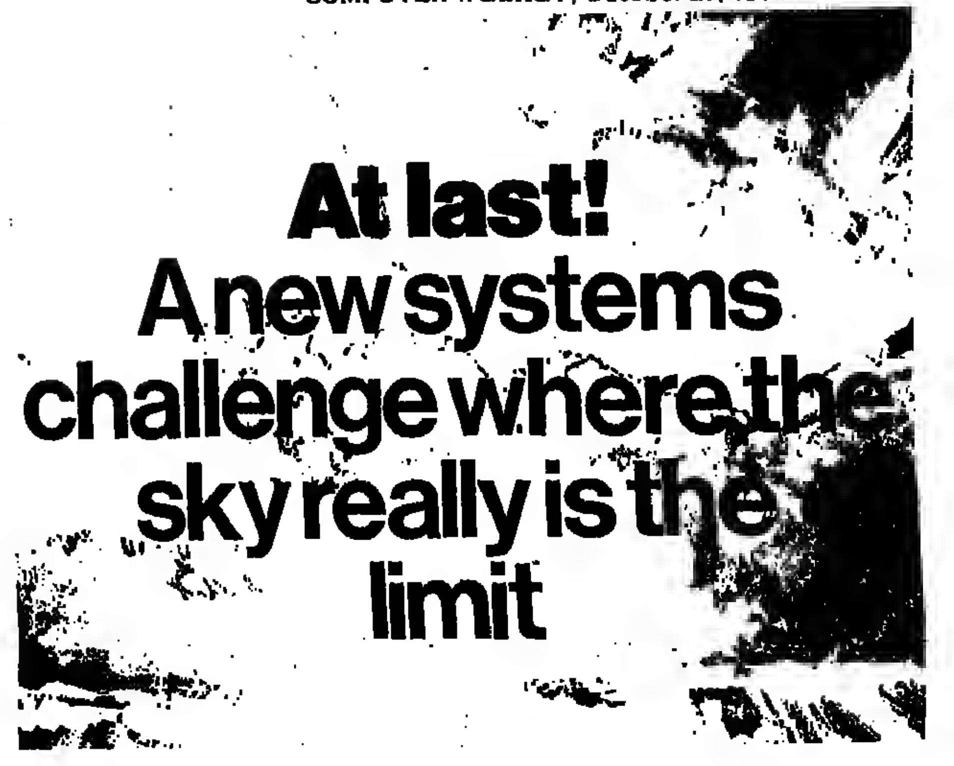
Further details from the Secretary, The London Hospital Medical College, Turner Street, London E1 2AD, telephone 01-247 0644 ext. 47, to whom applications (two copies) together with names of two referees should be sent within 21 days.



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Up to £4,983 p.a.

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North Western Regional Health Authority — Prestwich, Manchester COMPUTER CENTRE

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UNIVERSITY OF NEWCASTLE UPON TYNE
DEPARTMENT OF TOWN AND COUNTRY PLANNING

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Applications are invited from graduates with appropriate qualifications and experience for the post of COMPUTER PROGRAMMER in the Department of Town and Country Planning which is a major computer using department within the University. The University operates an IBM 370/168 under OS and MTS and the Department has its own terminal facilities. Candidates should have experience of FORTRAN and be able to assist in the teaching and application of simple statistical, modelling and computer graphic techniques.

Salary will be at an appropriate point on the Range IA scale £3,883-£6,555 p.a. according to age, qualifications and experience. Membership of the appropriate University superannuation scheme will be required.

Further particulars may be obtained from the Registrar, The University, Newcastle upon Tyne NE1 7RU, with whom applications (3 copies), together with the names and addresses of three referees, should be lodged not later than 17th November 1978. Please quote reference CW.

THE LONDON HOSPITAL MEDICAL COLLEGE (University of London)

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Applications are invited for the above post from graduates and/or those holding an appropriate professional qualification.

The appointee will be in charge of the computer section which has a staff of five currently. A PDP 11/10 computer is used for both local processing and as a remote terminal to the computers in London University.

The post requires both administrative and programming ability; a first degree in mathematics would be helpful though not essential. Applicants should be graduates or have an equivalent professional qualification.

Salary will be on the Grade II Scale £[illegible] plus £450 London Allowance per annum. Superannuation within the USS.

Further details from the Secretary, The London Hospital Medical College, Turner Street, London E1 2AD, telephone 01-[illegible] ext. 47, to whom applications (two copies) together with names of two referees should be sent within 21 days.

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We offer substantial extra benefits, eg. pension scheme, all relocation expenses and considerable travel advantages. A knowledge of German is not essential as the company will provide language tuition.

Interviews will be held in London in the near future. Applications should be sent in writing to:

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Programmers should have Assembler or Cobol experience. Knowledge of T/P would be desirable but not essential.

Please write giving details of experience and age, to: **Financial Controller, Royal Arsenal Co-operative Society, 147 Powis Street, Woolwich, SE18, or tel: 01-854 2000, ext. 542 or 418.**

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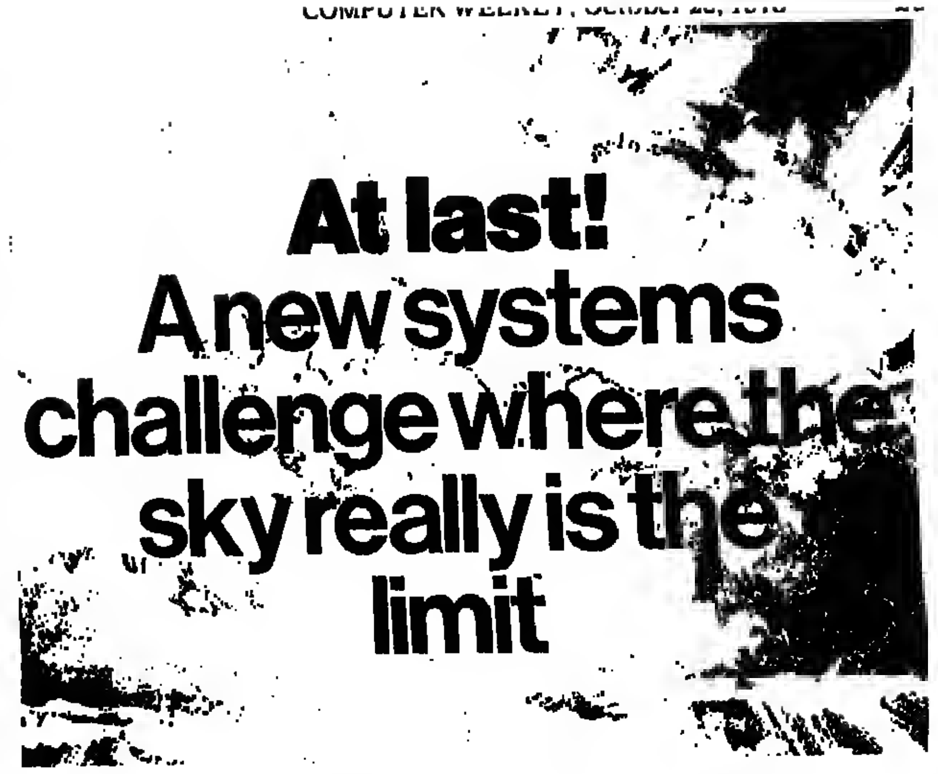

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For further information or for an informal discussion, please contact Clive Wright on 01-242 9356 or write to the address below quoting Ref 496/CW. If it would be more convenient to telephone in the evening or during the weekend, the number is East Grinstead (0342) 22270

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Salary will be commensurate with age and experience on scales £4131-£7754 (under review) and in the case of the Senior Post would extend to £[illegible] (under review) plus £450 per annum London Allowance.

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Further details and application form are available from the Assistant Secretary, ULCC, 20 Guilford Street, London WC1N 1DZ. Telephone 01-405 8400.

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Newark District Council

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RW 43/6

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RE 43/7

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RW 43/1

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LEIGH

SOFTWARE TECHNIQUES

My program works — I assert

Parallel processing systems and applications of microcode have stood out as recurrent themes in the software activity of the last year.

Microcode, in the guise of firmware, has attracted the attention not only of the industry, for its increasing role in IBM operating systems, but also that of the EEC, which was concerned with the possible impact on minicomputer software portability (Software File, August 17).

In this supplement, we examine IBM's use of firmware (page 32, 33) as well as reviewing the basic capabilities and limitations of microcode itself (page 34).

Parallel processing has surfaced particularly in discussions of "dataflow" architecture and distributed operating systems such as the NPL's Demos (Software File, July 27). As an investigation of the implications for programming, we look at what is likely to be one of the first end-user systems, ICL's Distributed Array Processor (page 35).

Finally, on this page, Dan Simpson of Sheffield Polytechnic discussed a method of program development which has recurred strikingly as the major theme of recent computer science gatherings.

By Dan Simpson

DURING the past few years we have seen a number of changes in the way we write programs. Many of these ideas have gone under the general banner of structured programming.

If we try to abstract out what this movement has been all about, we soon see that the major change has been a shift of emphasis towards the early parts of the program production process.

In fact, the whole idea has been to design programs so that they have a high probability of being correct, and so to cut down the amount of debugging which has to be done.

The "old hands" at the game will, quite correctly, point out that these techniques have been little more than a formalisation and codification of the best practice of good programmers.

In this article I will introduce another such technique which underlies much of the current research into programming. The technique goes under the name of "Use of assertions and invariants" and we shall see that in embryo form, it has been around for a long time. However, in its new guise it will provide another very strong, useful weapon in the programmer's arsenal. Indeed, if taken to its logical conclusion it could be the start of one of the largest breakthroughs in the program production process.

Let us start by considering three topics with which we are all familiar, that is, comments, modular programming and core dumps. Comments are, of course, included in programs to aid the readability of the code and are often used to summarise why we have reached a particular part of the program, and what the next fragment of program will achieve.

Used in this way we can think of comments as a very high level language specification of what is going on in the program with particular details spelled out in the programming language being used.

The concept of modular programming takes a large program and splits it down into functional units, so as to better organise an attack on the program's complexity. This allows us to have a tight specification for each of the fragments of code which are to be used to solve the problem at hand.

The fact that these fragments can be either subroutines or macros only further justifies our idea of the programming language simply being used to spell out details.

The ideas of modular programming and comments come together when programming standards say that the specification of the use of a routine must be given in comments at the start of that routine.

Core dumps provide the final level of detail of the description of the computation. We can take a picture of the contents of storage just before each instruction is obeyed, and so obtain a film of the execution of our program; this is the so called process view of computation.

If we ask ourselves how much use the film so obtained is, we soon come to the conclusion that the answer is "not much". It is the old problem of not being able to see the wood for the trees.

We then may ask ourselves what would be a better level at which to take the film, so as to have just the right amount of detail.

I would suggest to you that the level required is the level at which we inserted comments into our program. That is the level at which we expect the program reader to understand it without the detail of the programming language. In sections of tricky code used to gain some type of efficiency we may well want to look at the film after each high level language statement, as we know that such areas of code are often areas where we may well be susceptible to errors.

The use of assertions and invariants simply ties together the view of computation we have just developed and in doing so formalises the use of comments.

The specification of a program simply defines the input/output requirements and what the program does. The specification of each of our program fragments does exactly the same, and as we know, the programmer's task is to break down the former into uses of the latter. So we may well ask "what's new".

It is here that we notice that if the program is correct then we should be able to establish a logical relationship between the comments used in the various adjoining fragments of code.

Indeed, the input to our first fragment and output from our last fragment should be exactly the input/output specification of the program, and for the routines within the program the output of one should be exactly the input of the one following.

Thus we get the idea of either augmenting or replacing our comments with strict logical formulae about the states of the variables in our program (our high level core dump idea). Then it should be possible by following the laws of logic to ensure that our program is constructed correctly.

We place into our program *assertions* of when and how variables change. The variables which should not change, or only change in a systematic way, we call *invariant*.

From a historical point of view Robert Floyd of Stanford University in 1967 proposed the use of assertions as a way of proving programs correct while Peter Naur of Copenhagen University suggested in 1969 the alternative approach to this idea by using assertions and invariants as specifications of subroutines to ensure that they were used properly.

More recently the work has been taken much further into its theoretical aspects by Tony Hoare of Oxford University, who has done a lot of very valuable work on program proving, and on the axiomatic approach to programming.

Thus it may seem that we are well on our way to being able to prove that programs work. All we have to do is to write out the assertions for each of our routines and by following the rules of logic, we simply work through and that's it. I hope that by now you are asking "Where's the [illegible]" [illegible] of course, in that word "all" in the above sentence. It is not exactly obvious to me how the assertions are to be found. It is often argued that if we cannot find the assertions we do not really understand the solution, and so we should not think we can write a program.

I have a lot of sympathy for this feeling, but not every programmer is skilled in logic and even *if the assertions are found*, there is still a lot of "leg work" to be done in showing that they follow from each other as they should.

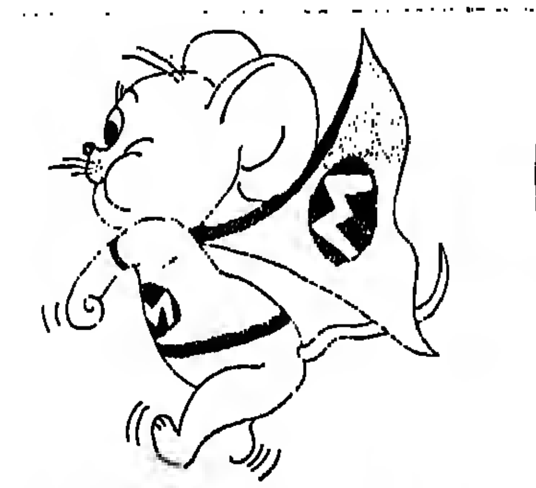
Further, the theory is not yet sufficiently well developed to take into account all types of programming techniques – side effects are a particularly nasty problem.

But the technique can, and should be used by programmers for two major reasons.

Firstly, it makes quite clear all the assumptions which have been made in writing the program, thus at the program design stage these can be checked back with the user and any anomalies can be sorted out before the program goes live.

Secondly, it makes the pro-

● Turn to page 35



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By John Spencer

Microcode, also known as firmware, is by no means a new idea, although IBM has recently emphasised its importance by exploiting it as a competitive tool in its battle with the plug-compatible mainframe manufacturers.

John Spencer, publications director at Infotech International, examines the price/performance arguments for the use of microcode and takes a close look at some of IBM's ulterior marketing motives behind the use of microcode.

The material used in this article was derived from the Infotech State of the Art Report "IBM" published this month.

DURING the past fifteen years, computer architects have found it quite advantageous to design low- and medium-performance computers with an elementary repertoire of micro instructions, sequences of which represent ordinary machine instructions available to the user.

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Recently IBM has disclosed its strategy for moving customers from the older 360 and 370 computers to the next mainframe generation: emulation of control program "hot spots" (frequently-executed supervisory routines which cause performance losses). On smaller-scale operating systems (OS/VS1 and VM/370), IBM offers Extended Control Program Support (ECPS) an inexpensive collection of firmware routines.

For its largest operating system, MVS, IBM offers both firmware routines (extended facility) and conventional software improvements (systems extensions) for the 370/158, 168 and the 3030 series.

On the 370/188, the use of MVS/SE is claimed to improve performance approximately 14% for a $65,000 purchase price tag, or about 2% to 4% price increase over the combined price of the 370/168 CPU and memory.

Thus this product, which consists of about a dozen microcoded instructions replacing parts of the operating system, improves the performance to price ratio of the 370/188 system.

With IBM's "state-of-the-art" operating systems, approximately only one-third of the full computational power is used in program ("user") state. Furthermore, OS/MVS and VM/370 typically have little "contingency reserve" of CPU power, since they run, respectively, at 85% and 80% CPU utilisation at an average well-tuned customer site.

If an installation cannot meet its batch throughput commitments with MVS on its current processor, it has only two alternatives: 1. adding a CPU (a less-expensive Attached Processor System or a very costly Multiprocessor System), and 2. upgrading to the next level of CPU: 158 to 168, 168 to 3033, etc.

By moving "hot spot" functions from ordinary supervisory software into firmware, IBM can achieve two cost-performance goals for its customers: 1. reduce the supervisory percentage of CPU activity; and, 2. raise the user-state percentage of CPU activity.

It must be emphasised how important the second cost/performance goal is to batch throughput. A hypothetical increase from, say, 34% to 40% corresponds to an 18% increase in batch throughput per hour, per day, or per annum.

This gain is fundamentally independent of the CPU supervisory percentage, CPU inactivity percentage ("wait state") numbers and speeds of peripherals and other factors.

Four types of software components are currently being microcoded by IBM:

1. general supervisory "hot spots" including virtual storage management (GETMAIN/FREEMAIN), main-storage management (page allocation/deallocation) and presentation and synchronisation of I/O requests (EXCP/WAIT);

2. channel programming "hot spots" including interpretation of channel programs into real addresses, fixing relevant pages into real storage and responding to I/O interruptions and consequent "process interpretation" into virtual addresses;

3. assistance to special VM/370 "hot spots"; and

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The table in Figure 1 shows where IBM has invested in each of the above types of firmware. The approximate reductions in supervisory overhead are shown in Figure 2.

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The price performance benefits outlined above are only part of the rationale behind IBM's use of microcoding techniques. A number of marketing objectives can also be identified namely to:

1. render 370 manufacturers obsolete;

2. encourage customer migration to the newest OS.

OS	Extended code / program support	APL assist	Figure 1. Types of firmware.
DOS/VS	–	–	
OS/VS1	(1)-(2)	(4)	
OS/MVS	–	(4)	
VM/370	(1)-(3)	(4)	

OS	Microcoded by	APL	Figure 2. Percentage of reductions in supervisory overhead due to microcoding OS.
	ECPS		
OS/VS1	15	0	
OS/MVS	–	0	
VM/370	40	0	

3. offset the price/performance advantage of "look-alike" mainframes;

4. strongly protect designs of the newest OS by patenting new firmware;

5. thereby deny this OS to "look-alike" competitors, who must copy the firmware design in order to use the OS; and,

6. later, raise prices considerably for the firmware and corresponding OS.

Along with other major mainframe manufacturers, IBM in recent years has followed a strategy of unbundling and modularisation in system design.

The chief reason for the rapid acceleration of modularisation is the proprietary edge it will return to the larger suppliers who will foster it because they can control the pricing structure.

Except for the interfaces with the application programs already written by the customer, which are almost inviolable over the shorter term, the interface between modules and changes in those interfaces may be controlled by the supplier in such a way as to put the plug-compatible products of the smaller independent companies in jeopardy.

The risks of litigation against such actions will be reduced by the offering of performance improvements with new modules and by the complexity of explaining the technological concepts to a judge or jury, which gives the large companies a psychological advantage.

This advantage has been evident in the trial of several of the peripheral manufacturer and Government suits against IBM; the complexities, and therefore the advantage, are increased when concepts such as operating system software, microcode, hardware, and trade-offs among them are involved.

The large mainframe manufacturers such as IBM will keep making changes in module interfaces, permitting them to leapfrog independent companies that attempt to duplicate certain isolated modules and thus to displace the products of the larger companies.

This possibly continuous leapfrog strategy has already emerged in the struggle of the manufacturers of plug-compatible CPUs against IBM.

The MVS/SE mentioned above is one example of the implementation of this strategy by IBM. MVS/SE offers the user performance improvement for a price, and alters the interfacing of the operating system with the hardware so as to create an advantage over the plug-compatible CPU manufacturers which use the traditional bundled, and therefore free, operating system.

Through the performance improvement, IBM justifies to the customer taking the software or, in this case, the microcode out of the public domain, and, at the same time, it puts the plug-compatible CPU manufacturers at a disadvantage.

Naturally, the PCMs can respond with performance improvements in their systems to maintain their competitive positions. They may do so in several ways, including the following:

1. improving the operating performances of the hard-wired part of the plug-compatible unit while maintaining the price;

2. microcoding other parts of the operating system so as to generate a performance improvement: and,

3. replicating the new microcode of IBM through reverse engineering.

All of these possible responses could put some pressure on margins, and all would involve some time delays.

For example, reverse engineering of the microcode would probably require many months. From the time the independent company first obtains the technical specifications of the IBM Microcode which would be at the time of the first deliveries of the IBM product, it could take from three to 12 months to duplicate the microcode module, depending on how complicated and sophisticated the microcode functions are.

Thus the independent company probably have a reverse engineered product ready within six months to two years following the IBM announcement, assuming the time between the IBM announcement and the first customer shipment is from three months to a year.

Whether or not IBM will be successful in this strategy is open to question. IBM has continually been surprised by the competitiveness, strength, and flexibility shown by independents.

Companies like Itel have been around for 10 years and have learned to cope in a rapidly changing environment. When they develop machines, part of their job is to make those machines so flexible that they can respond to IBM's moves. Itel's Advanced System series, for example, on a one-for-one basis, has as much if not more microcode capability than the equivalent IBM machine.

For example, the 3031 has a microcode address limitation of 8K words. The words are 76 bits long, 72 of which are used in microprogramming. (The 3031 uses the same microcode width as the 158, which also had the 8K limitation.) Itel does not have this limitation, and consequently the Itel 7031 will have improved virtual machine assist even though it and the 3031 may be equivalent in hardware terms.

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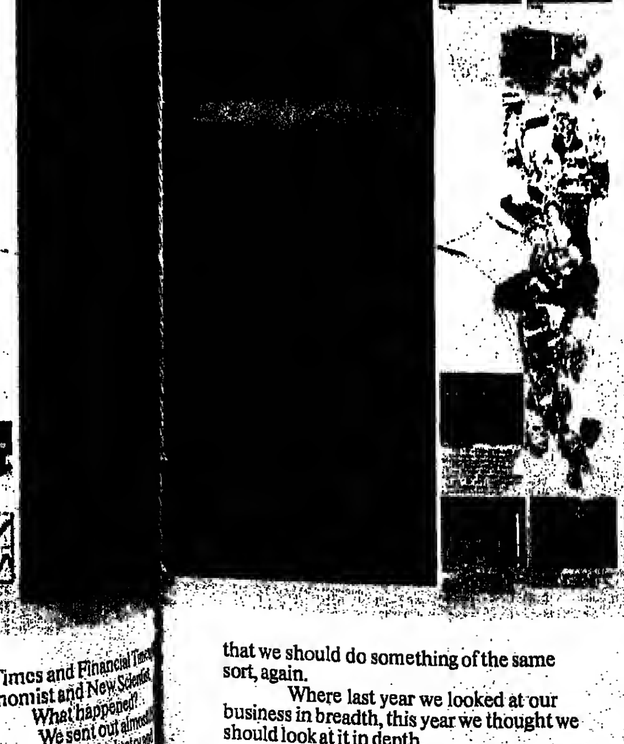

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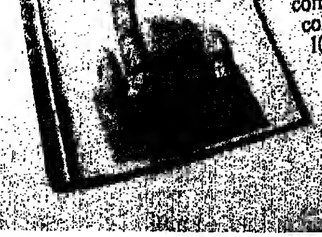

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Extended facility	APL assist
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(1)-(3)	(4)
	(4)

Figure 1. Types of firmware.

	APL
	0
	0
	0

Figure 2. Percentage of reductions in supervisory overhead due to microcoding OS.

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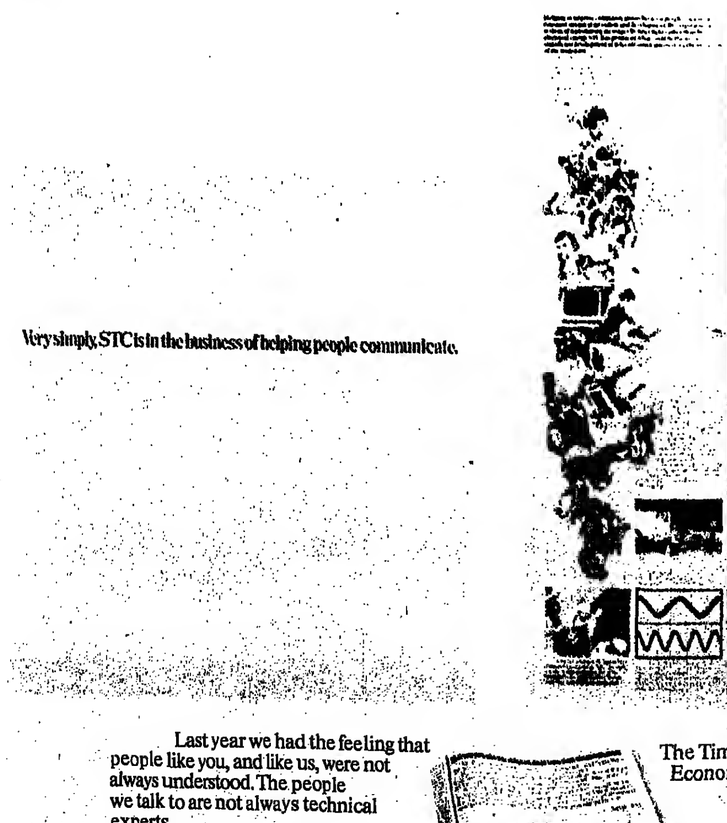

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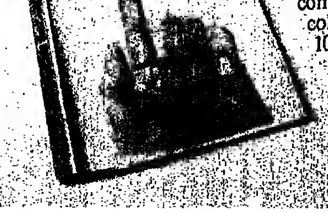

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Benefits of using firmware effectively

By Jon Kerridge

Interest has increased lately in the use of microcode, also known as firmware, in computers and computer operating systems. Jon Kerridge, a senior lecturer in Sheffield Polytechnic's computer studies' department explains what it is and how and where to use it effectively and also dispels some of the confusion surrounding it.

Kerridge's responsibilities include the evaluation of hardware for computer laboratories and lecturing on computer architecture. He is a member of Codasyl's database administration working group (DBAWG) and his current research interests focus principally on microcode simulators and distributed operating system.

THERE has recently been a lot of interest in the use of microcode (or firmware) in computers and computer operating systems. In this article I will try to explain what microcode is, why it is used, and what benefits are to be gained by using it.

In the same way that a program is a sequence of micro-instructions. Take for example an instruction which loads a memory location with a value from a user register.

In order that this instruction can be executed, the following micro-instructions have to be obeyed:

1. the address of the required memory location has to be placed in a memory address register;

2. the contents of the user register have to be transferred to a memory buffer register: and,

3. the memory has to be write activated which causes the contents of the buffer register to be placed at the location specified in the address register.

It can be seen from this simple example that the micro-instructions operate upon the component parts and electronics of the computer using registers which are not available to machine language programmers.

It also means, incidentally, machine language is not the lowest level of programming. There is a micro-instruction for each transfer path and operation in a computer. By combining some of these micro-instructions into a sequence, specific machine language instructions can be created.

The process of generating these sequences is called microcoding. Each machine instructions therefore, has associated with it a specific sequence of micro-instructions. The microcode of a computer comprises all the micro-instruction sequences needed to specify all the machine instructions.

The microcode can be stored in two ways.

Firstly, it can be built into the electronics of the computer. This has the advantage of being very fast when obeyed, but it is difficult or impossible to change.

Secondly, sequences can be stored in a special, fast micro-instruction memory, a particular sequence being obeyed when the related machine instruction is required. This second method has the advantage of being more flexible because the memory can be easily changed, but it is slower when it is executed, because the memory has to be accessed.

Microcoding is common to all computers, what varies is whether it is implemented by electronic circuitry or a special memory. It is when all or part of the microcode is stored in a memory that it becomes useful in what can be done with it after the computer has been finally constructed.

The microcode facility of a computer can be used in many different ways including: marketing a range of computers, software security, speeding up throughput and language processing.

When a manufacturer introduces a computer to the market, he does so as a family of computers with different capabilities. The usual formula is, discounting such things as peripherals, store size and software, the higher up the range the faster the computer.

The single most important aspect of the range is that all members have the same instruction set. This means that software written for one member will run on another member. It also means that by upgrading to another member of the range, the software will run faster, producing the inducement to upgrade.

To achieve this variability of processor speed, the manufacturer provides differing amounts of microcode in hardware. At the low end of the range, many instructions will be software microcoded, thus these instructions execute relatively slowly.

As you go up the range, more of the software micro-coded instructions become hardware micro-coded, and therefore executes more quickly. By deciding which instructions to software microcode a manufacturer can tailor his range of computers to market requirements.

Further, the upgrade to a faster processor will be achieved by removing some of the micro-code store and replacing it by the electronic equivalent. A simple matter of changing a few components boards.

One of the major and most costly products of any computer system is its operating system software. Most manufacturers can provide the operating system in ordinary machine language coding, knowing that there is little risk of anybody stealing that software.

However, IBM is the exception, because Amdahl has been producing carbon copy IBM hardware and then using software written by IBM.

Much of the initial cost of a computer system is aimed at recovering the software development costs and by this means Amdahl has been saving this cost. IBM has, therefore, implemented parts of recent operating system supervisors in microcode, which are then incorporated into the already existing microcode store.

Hence in the case of some supervisor functions, instead of obeying an ordinary machine language procedure, a call is made upon the microcode store. As a result, the complete source of the operating system is no longer available.

The only way to copy an operating system organised in this way is to copy the micro-code store and its contents, a far more difficult task.

This technique also has two beneficial effects for a user, namely, the operating system executes more quickly because the supervisor is microcoded, and it will also be more robust because it is now impossible for a user program to accidentally over-write the supervisor.

Some minicomputers are provided with what is called a writeable control store (WCS). This is a separate memory which is accessible to the general user or program in which he can store his own micro-instruction sequences. Normally the micro-code store is not accessible by the user.

A user can generate his own micro-instruction sequences, store them in the WCS and then write machine language programs which call these sequences.

The mechanism used is that the user defines a new machine language instructions which are stored as part of the ordinary operation code table so that a correct entry into the WCS can be generated when the program is obeyed.

There are many uses to which a WCS facility can be put; but they are, however, somewhat dependent upon the system being written. In a particular system it may be found that a particular routine or loop is being obeyed very frequently; such a code segment is ideal for microcoding.

By re-writing in microcode that segment will become faster, and hence the overall system speed will improve.

The time which is saved could be crucial in a process control environment in which time is of the essence. It can be used in compilers where one part of the compiler is used very frequently (for example: find next symbol) and microcoding can therefore, increase compiler throughput.

Computers which have a WCS will provide a software tool which allows the user to find out which part of his code is most frequently obeyed.

Normally, WCS is only provided on minicomputers, because those machines are ones which get used in dedicated environments where the facility is useful.

In such a situation the computer will only carry out one task, and thus once the WCS has been generated, it can be left alone. This is in contrast to the general purpose mainframe where there are many different tasks, all possibly requiring a change in the WCS, and thus its use becomes infeasible.

The final use of microcoding is one which is somewhat in the future. This is, rather than having a compiler for each language which runs on a computer, why not make the computer process the language directly. A computer directly processes machine language because the correct micro-instruction sequences have been generated.

This is precisely the situation in a computer in which all sequences are software micro-coded. Hence, there is no difference between obeying Cobol, say, and machine language directly.

All that has to be done is to write micro-instruction sequences which analyse the language statements and cause the correct processing to take place.

Hence for each different language instead of having a software compiler, one would switch control to a different part of the micro-code store. Naturally, overall processing would be increased because everything is microcoded.

The major problem is one of ensuring that the sequences are correct. It is much more cumbersome to change a micro-instruction store than it is the source of a compiler.

In conclusion, I should like to point out the confusion which can occur because of the use of the word "micro", especially in conjunction with micro-programming. This could either mean writing micro-instruction sequences or programming a microprocessor, the latter usually being in machine language. This article has described the uses of microcode and therefore should dispel that possible confusion.

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Recent advances in computer architecture for the "super computer" class of machine have all been concerned with the provision of array processing facilities by one of two routes.

While the "classical" route follows the line of the pipelined vector processors, true array processors have been developed which consist of an actual array of small computers working in parallel under the control of a single instruction stream.

Dr R. W. Gostick, a senior languages consultant in ICL's DAP marketing unit, discussed the software requirements of the latest of the true array processor, the ICL Distributed Array Processor (DAP). It is apparent, however, that many of the features of high level languages for array processors are equally relevant to vector processors.

Dr Gostick also concentrates on high level language facilities while giving a brief overview of the operating environment.

Programs for ICL's Distributed Array Processor

By Dr R.W. Gostick

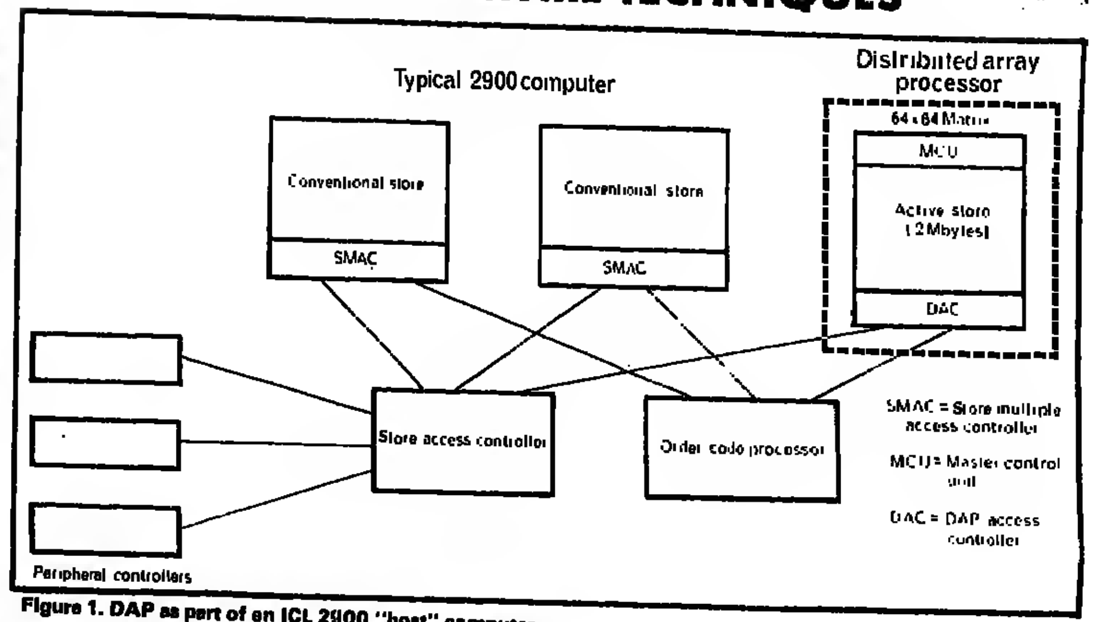

Figure 1. DAP as part of an ICL 2900 "host" computer.

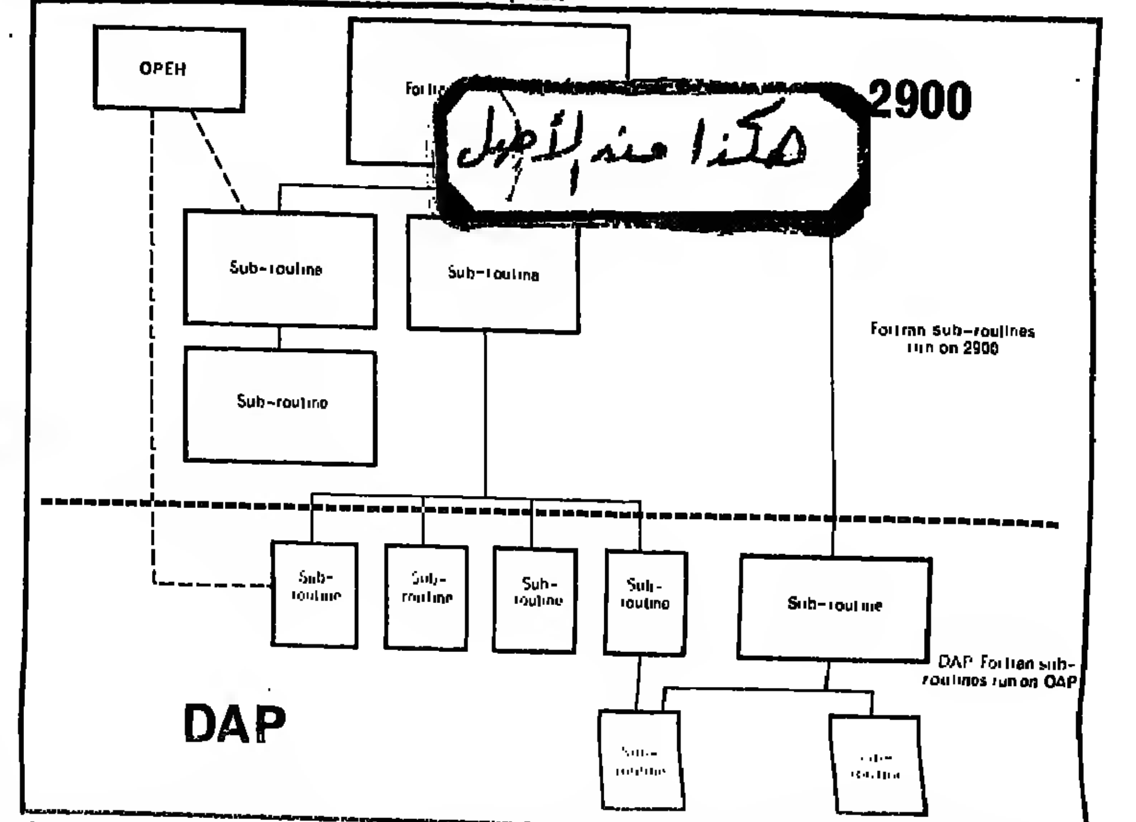

Figure 2. Structure of a program running to DAP and a 2900.

TO appreciate the operation of DAP, it is necessary to know how DAP exists within a conventional system. Figure 1 shows the DAP as part of a standard ICL 2900 host computer, where it takes the place of a standard 2 Mbyte store module.

The basic hardware concept of DAP, i.e., the association of each of the 64 x 64 (4,096) individual processing elements (PE) with a 4K bit semiconductor store chip means that the 2 Mbyte store module may be accessed either by the serial 2900 as normal store, or by DAP as "active" or array store. This dual function considerably reduces the hardware and software development required to support a DAP on the host machine.

In particular, all the operating system facilities of the host machine, such as editors, compilers and database facilities, may be used to perform serial processing on data within the DAP store.

The only major modification required to the operating system is to ensure that segments forming part of a DAP program should be loaded into the DAP store rather than any other store module in the system.

The actual programming of DAP is carried out in the DAP Fortran language, which is a parallel dialect of standard Fortran. Subroutines written in DAP Fortran, which then run on DAP, interface to standard serial language programs running on the 2900 by a simple CALL interface.

Usually the serial program will be written in standard 2900 Fortran, but there is no architectural restriction to the serial language which may be used since 2900 supports full mixed language programming facilities.

Since the data residing in the store may be accessed both by the 2900 and the DAP, there is no equivalent of "loading" data into the DAP. All data shared by Fortran and DAP Fortran routines is held in Fortran COMMON blocks, and hence the overheads associated with calling the array processor are minimised.

One major advantage of the integration of the DAP into the store of the 2900 is that the full language-independent, high-level diagnostic system, common to all VME/B high level languages, may be extended very simply to cover DAP Fortran.

This leads to the overall program and diagnostic system shown in Figure 2 and gives, for the first time, the processing power of a super computer with the user diagnostic facilities of a modern operating system integrated on 2900 into a common language independent package, OPEH.

Any manufacturer of a new computer architecture has to decide what high level languages to run on the new hardware. There is, for example, a decision to be made between the adoption and extension of familiar, well-used languages such as Fortran and the use of more recently introduced languages such as APL or Pascal.

However, as the vast majority of super computer users are still dedicated Fortran programmers — more perhaps from habit than from any intrinsic qualities of the language itself — it is essential that all super computers provide a Fortran system as the major programming language.

It is becoming increasingly obvious, however, that the basic serial nature of Fortran is a severe limitation both for the DAP type of array processor and for the vector processors.

Optimising compilers and their extension into vector compilers have been tried as a mechanism for dragging Fortran into the super computer architectures, but even these can fail on such a simple piece of Fortran code as the standard matrix multiplication.

It is even more obvious that no compiler, no matter how clever, can change algorithm design. Once a programmer is forced to change his code to "aid" a vector compiler or to use a parallel architecture, it is reasonable to provide suitable tools for him to do this, and for this reason DAP Fortran has deliberately been designed to include full array processing facilities.

DAP Fortran recognises two new modes of storage and operation, vector and matrix. A vector is defined as a set of D items, and a matrix is a set of D x D items, where D is the basic dimension of DAP. (D = 64 for the production DAP.)

These new variables are acted on in parallel, and hence for matrices A, B and C the single DAP Fortran statement:

```
A = B + C
```

replaces the conventional Fortran:

```
  DO 1 I = 1, 64
  DO 1 J = 1, 64
1 A(I, J) = B(I, J) + C(I, J)
```

Similar facilities have been added to other extended Fortran compilers, but DAP Fortran adds further new facilities, exploiting the hardware of the DAP to provide high level constructions. One such construction is the provision of shift indexing, replacing Fortran expressions such as A(I + 1, J) by A(+,), which enables a complete mesh relaxation code to be written as:

```
X = (X(+,) + X(-,)
    + X(,+) + X(,-)) *0.25.
```

The equivalent code in Fortran would require all the well known DO loop overheads, as well as the necessity to consider the edge conditions when, for instance I = 1 in A(I-1, J). In DAP Fortran the edge conditions are handled naturally by allowing the programmer to choose the boundaries by a simple GEOMETRY statement.

By providing hardware connections between opposite edges of the DAP array, it can be made to simulate mesh problems on a plane, cylindrical or toroidal surface.

The most important feature within the DAP, and within DAP Fortran, is the ability to process selectively on various elements of an array, depending either on the data held within a processor or on fixed conditions within the array. A Fortran statement within DO loops of the form:

```
IF (A(I, J).LT.C) B(I, J) = expression
```

may be replaced in DAP Fortran by:

```
B (A.LT.C) = expression.
```

The subscript of B is now a logical expression, comparing in each processor the local value of A with the constant C. Only for those processors where the result is true will the expression be evaluated and assigned to the element of B.

All this work is now, of course, performed in parallel, with none of the problems associated with conditional jumps on a pipeline processor.

This process can be extended to handle more general cases. The expression A.LT.C returns as its result a boolean matrix. On DAP, which is a bit-oriented machine, a boolean matrix can be stored simply as one bit in each processor.

These matrices may be declared and manipulated within DAP Fortran using the familiar logical expressions of Fortran. A typical example would be Figure 3 above.

```
INTERIOR = ROWS (2,63).AND.COLS (2,63)
X (INTERIOR) = INSIDE — FUNCTION (Y)
X (.NOT.INTERIOR) = OUTSIDE — FUNCTION (Y).
```

Figure 3. An example of declaring and manipulating matrices within DAP Fortran using the familiar logical expressions of Fortran.
The underscore character "—" can be used in DAP Fortran names as a separator to improve legibility.

In this case, the two supplied boolean functions ROWS and COLS have been used. DAP Fortran provides many new functions to aid the high level user, including powerful and efficient global testing functions. The MAX function is extended to work on array (vector or matrix), and can provide the maximum value of a matrix in 50μsec, simply by writing:

```
S = MAX (A).
```

The ANY function returns a true value if any element of its logical array argument is true, giving, for example:

```
IF (ANY (X.GT.0.0)) CALL SOLVE.
```

This article gives only a brief insight of the facilities available within the DAP Fortran system. Perhaps the most significant feature of the system is that there is a very small performance penalty when using DAP Fortran compared with the assembly language on the DAP, in contrast with the very much larger overheads on a conventional implementation of Fortran on a serial or vector machine.

In this respect, it can be said that DAP is one of the first true high level language super computers.

My program works

● from page 31

grammer use simple constructs. We could argue forever whether this is a good or bad thing, and whether it stifles programmer creativity, but if we wish to develop reliable amendable programs, it is a rule we should stick to.

In summary, I am saying that the programmer will have to do a little more work for a lot more pay off. That is, less programming time will be wasted.

However, we have still to face the argument that the tedious algebraic work of showing that the assertions follow correctly from each other must be done. But again we should notice that this is exactly the kind of work which a computer can do very well.

Michael Griffith of Nancy University is here giving us a lead by developing a language and compiler which expects assertions as part of the source program. The compiler checks these assertions and points out any anomalies to the programmer. Indeed, the compiler goes even further and will refuse to compile any program it cannot check.

Thus we are observing the development of a technique which helps the programmer produce more reliable programs; of course, the programmer has to learn how to find his assertions, but this is no more difficult than learning to program, indeed it can be argued that it is part of learning to program correctly. We are also seeing the development of languages which make it easy to use the technique.

A lot of the theoretical work has been done and can be found in most books; section 7.3 of Brady's "The theory of computer science" contains a good review and examples.

The topic is being discussed at just about every seminar on programming, and it will not be long now before we see it used by many professional programmers.

The use of assertions is just another tool for producing reliable programs, but its probable major impact will be that it will make it harder to write bad programs.

Severe lack of skills

By IAN SCOTT and DAVID FISHER
QRH Software Ltd

SCOTLAND, England or Wales — wherever I go the problem seems to be the same. There is a severe lack of expertise within the DP industry. Is this then a case of one man's meat is another man's poison or perhaps to coin a new phrase "the employee's dream is the employer's nightmare"?

I don't believe that it works like that. Unfortunately, an unbalanced market works against both sides and many careers have suffered severely because of the DP staff market situation.

We are going to examine several aspects of the basic subject of recruiting staff with technical expertise, how the present situation helps and hinders the employer, what effect it has on the DP industry, why Scotland is different and what help the government can offer.

Despite the fact that we are all human, it is necessary to consider the situation in the same way that we would any normal marketplace. The seller in this case is also the product. After all, we sell ourselves in return for money to live, just as a manufacturer of carpets sells carpets for money to live. The difference between his selling price and his costs is his profit, the margin on which he lives. In the same way, the difference between the worker's income and the cost of his necessities is the profit or margin on which he lives.

In any marketplace, where the goods available are substantially less than the demand, the prices rise to reduce the demand — or some bright person steps in and increases the supply. So in the period of short supply, prices, or in this case wages, increase out of proportion to the rest of industry and commerce.

This seems a very rosy picture for the seller — but is it?

Every abnormal market situation has very obvious benefits to one side and major drawbacks to the other. However, it is very rare to find that either side finds only advantages. We believe that the DP professional has suffered in various ways, but we think that there are two major negatives.

The first, as a buyer in an unbalanced market, often your only course of action is to reduce your needs. Many DP installations have remained small to avoid the staff shortage problem. Many applications which would have been computerised have been handled by "some other method" to minimise the problem.

The second side-effect is that fewer computers are sold, new installations are kept small, existing installations do not upgrade as soon as they should

The above two points directly hinder the DP person. Work opportunities are often limited to routine financial and commercial applications and therefore real experience does not increase, and because the market expansion is kept down artificially, job security and future promotion prospects are being sacrificed.

From the employer's point of view the market is no different from any other. Does he have to employ people who are going to cost him more every year, people whose next 12 months' costs cannot be forecast accurately?

In the time of crisis we find alternatives. Several have been taken in the past, and because the market isn't changing, will continue to be taken.

The effect on the DP industry is a very important one. If prospective users find solutions, ways of minimising the use of computers, then the demand for computers is affected. This reduces the marketplace. It therefore follows that if the DP industry were to overcome the staff shortage problem then the market size would increase to its real size, as one of the major constraints will have been removed.

We have taken a long time to get round to Scotland. We have gone through the points above first because they relate to the whole of Britain. Scotland is just the same as anywhere else in most respects of the DP expert market. However, it does differ in some important ways.

Scotland is a nation well served with beautiful countryside, mountains and lochs. It is a joy to be in most areas — to walk, to drive, sail or just sit back and drink in the breathtaking scenery. This often unspoilt beauty can, however, work heavily against industry, the DP industry no exception.

Unlike some parts of Britain where industry is concentrated into large centres and population is high, the major industrial areas of Scotland are often isolated, eliminating the opportunity for people to move place of work easily.

With this situation it is easy for a DP person to become an expert in a particular field only to find that the only place to sell his services is away from his home area. The same problem affects the employer. He may develop an installation with a need for particular expertise only to find he cannot get that expertise.

A restricted market as a result of staff shortage also affects employment in Scotland significantly. A number of major computer companies manufacture computers, peripheral equipment or parts in factories in Scotland. Expansion of the market would increase the number of jobs available within the manufacturing side of the computer industry.

What can be done about the present situation?

A number of very positive things can be done. Action now will eliminate the problem and help reduce unemployment throughout Britain, and as Scotland is a region with more than its share of unemployment problems, it would be one of the first areas to benefit.

During the last nine months our company, which employs some 30 people, has recruited 10 trainees and we have spent considerable time and effort in training these young people for a career in DP. Having spent a little time in writing to various universities and generally letting Job Centres and various organisations know we were looking for trainee programmers, we have had an incredible response.

From most parts of Britain, and particularly from Scotland, over 150 people have written, telephoned or just walked in to our offices. Many who replied were ideally suited to the opportunities we were able to offer, but unfortunately there is a limit to the number of people that one can support in training at any one time.

As a nation we spend substantial sums of money retraining people who have been out of full-time education for a number of years through the TOPS courses. These include one for computer programmers. This is an 18-week course involving training in Cobol, Plan Assembler and RPG II (see this page). We have no official figures, but the cost per head must exceed £3,000. The trainee studies four separate languages. In addition to this the government pays many employers in certain industries employment grants to take on trainees.

How many companies like ours would willingly train more people if this finance were made available to the DP industry? We agree special checks would have to be made before grants could be made. As an industry we have no recognised apprenticeships for our new people. It would have to be restricted to companies employing a number of fully experienced DP professionals. And before the grant was paid, how about a written exam?

This may not be the full answer, but it would certainly encourage employers in train people.

The whole country could benefit. We have now waited a long time for action. Why not now?

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A career with BNOC offers unusually attractive career development opportunities. Salaries and conditions of employment together with relocation expenses, where appropriate, form an attractive package.

If you are interested in one of these posts please write or telephone for an application form quoting reference P/EC/KM/CW to:

The Group Personnel Manager,
THE BRITISH NATIONAL OIL CORPORATION
150 St. Vincent Street,
GLASGOW
G2 5LJ.
Telephone 041-204 2525.

This position is open to male and female candidates.

BNOC The British National Oil Corporation

UNIVERSITY OF ABERDEEN
COMPUTING CENTRE

SENIOR PROGRAMMING ADVISER

The University has recently installed a large Honeywell dual processor 66/80 System supporting a large terminal network.

Applications are invited for the above post. Candidates should normally possess an honours degree in science or mathematics and have experience of programming in at least two high level languages, having worked in one of the following areas: scientific, mathematical or statistical applications, non-numerical applications; data base management or graphics. Applicants should have at least six years' experience.

Salary on Other Related Staff Grade II Scale, £6,317-£7,754 per annum with appropriate placing.

Further particulars from The Secretary, The University, Aberdeen, with whom applications (2 copies) should be lodged by 17 November 1978.

COMPUTER OPPORTUNITIES IN SCOTLAND

OPERATIONS DEVELOPMENT STAFF

General Accident, Perth, Scotland

The Operations Development Section are responsible for the implementation and support of computer based business systems, including aspects such as the writing of user manuals, design of data input, system testing and the resolution of users' queries over a wide range of insurance applications.

In addition, the section performs a wide variety of support functions on behalf of the Operations Section.

We presently operate an IBM 370/145 under DOS/VS but a substantial upgrade to more sophisticated hardware and software is imminent.

As a result, a number of vacancies have occurred within the Operations Development area and applications are invited from experienced computer professionals. Knowledge of IBM hardware and software would be an advantage. Experience may have been gained directly within Computer Operations or from other areas of data processing activity.

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£4,660-£7,146

The North of Scotland Hydro-Electric Board will install in their Computer Centre in Aberdeen Duel I.C.L. 2980 computers in mid-1979 to replace their well established System 4 equipment.

An extensive terminal network will be supported and comprehensive software including database will be used.

Experienced Systems Programmers are required to develop this software and those with a knowledge of VME/B, MAC, TP or IOMS would be particularly welcome

Salaries will be in the ranges £4,860-£6,030 and £6,492-£7,146 including Productivity Bonus (Electricity Industry PAG3 and PAG4 scales) and generous assistance with removal costs will be given if required.

If you want job satisfaction in a stimulating environment phone Ken Hutchen at 0224 892871 for further information or send details of your qualifications and career to

Computer Services Manager
North of England Hydro-Electric Board
Computing and Accounting Centre
200 Ashgrove Road West
Aberdeen AB9 2NY

FIFE REGIONAL COUNCIL FINANCE DEPARTMENT

COMPUTER PROGRAMMERS

Salary: £3933/£4461 + £312 supplement

Qualification required: At least two years' COBOL experience. The Region has an ICL 1003A configuration, but this will shortly be replaced by an ICL 2960. A wide variety of work is undertaken and careers prospects are excellent

Application form and further details may be obtained from Regional Personnel Officer, File House, North Street, Glenrothes Tel Glenrothes 754411, Ext 246/8, to whom completed form should be returned not later than 9th November, 1978. **Please quote Ref. Number HP/497/382/CW.**

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TO £4,000

OPERATOR

TO £3,000

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Our client, a leading legal partnership, wish to recruit an Operations Supervisor and an Operator for their Philips P410 installation in Central Edinburgh.

The Operations Supervisor will work normal office hours and perform a dual role as Senior Operator/Supervisor. The ideal applicant will have experience in operating small business computers/V.D.U.s although serious consideration will be given to anyone with experience of operating larger systems.

The Operator will work flexi-time and again preference will be given to applicants with experience of small business computers/V.D.Us., however, candidates with relevant operating experience will also be considered.

The salaries are negotiable around £4,000 and £3,000 respectively and carry the normal fringe benefits.

For an immediate interview telephone Ron McCormid.

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c350 miles from London

Our clients, C. H. Oextor Ltd. are world leaders in the development and manufacture of highly specialised non-woven products. They are situated in the picturesque Scottish Borders approximately 9 miles from Berwick Upon Tweed.

They wish to recruit an Analyst/Programmer to adopt responsibility for a challenging variety of applications in both commercial and production control areas, including involvement in internal and external teleprocessing systems

The ideal applicant will have a degree or similar qualification, 2 years plus experience of systems analysis and a sound working knowledge of RPG II.

The salary offered is negotiable around £5,000 plus participation in a quarterly-profit share scheme, free life assurance, contributory pension scheme. Generous relocation assistance is available where necessary.

For further information telephone Harry Clark

SENIOR SYSTEMS ANALYST

Neg. c £6,000 + Excellent Benefits

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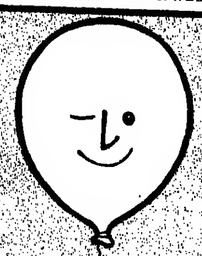

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Computing activities are based on an IBM mainframe with remote and local terminal links. The service offered extends to cover financial and marketing applications as well as the production areas of the organisation.

Candidates for this senior analytical role will have had control of one major system from feasibility to implementation and will have the ability to lead teams of Analysts and Programmers.

In addition to a competitive salary the company offer a Comprehensive package of benefits and good long term career prospects.

E2/2610

ANALYST/ PROGRAMMERS PROGRAMMERS

N.W. LONDON/MIDDX.

£4000-£6500

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This is an ideal opportunity to join a young department in which the successful candidates will be able to gain considerable experience of applications ranging from Production and Stock Control to Goods Distribution and Management Statistics.

The installation works to high standards and encourages the use of the latest techniques for which formal training is provided.

Candidates should have approximately three years' commercial experience encompassing design and specification writing. Applications from experienced Programmers who wish to progress to analysis will also be considered.

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Staff Services Division of BOC Datasolve Group and a member of Computing Services Association.

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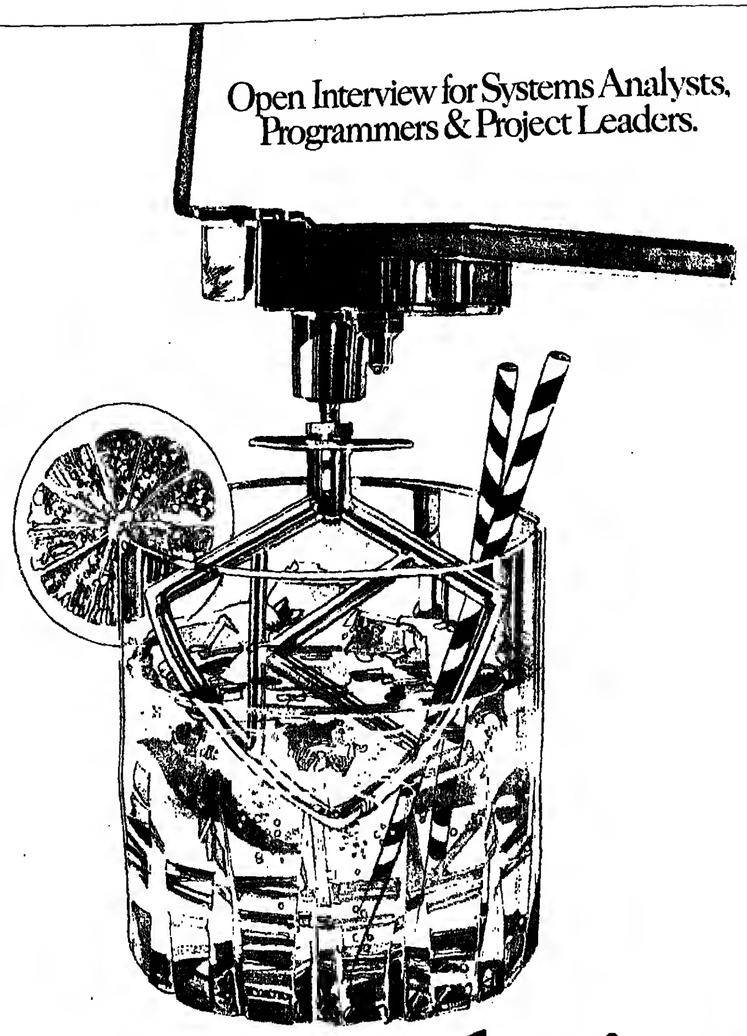

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SCHOOL OF ENGINEERING AND APPLIED SCIENCES

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Required from 1st January, 1979 until 30th September, 1981 to join a successful SRC supported team investigating the Computer Generation of Images and aimed principally towards the creation of a variety of images including displays of real scenes changing in real time and the production of diagrams involving lines and surfaces. Displays are presented using raster-scan colour TV/grey techniques. Applicants should hold either a doctorate or a good honours degree supported by significant industrial experience. Experience in both software and digital system design is desirable.

Starting salary dependent on age experience and qualifications in the range £3883-£5387 p.a. (with superannuation benefits) on the Research Fellow grade 1A scale (under review).

RESEARCH STUDENTSHIPS

Several Research Studentships available for suitable candidates with funding at SRC rates. Projects include Computer Generation of Images (as described above), and a variety of microprocessor applications undertaken in association with industry.

Applications from men and women together with curriculum vitae and the names of two referees as soon as possible, to Professor R. L. Grimsdale, School of Engineering and Applied Sciences, University of Sussex, Falmer, Brighton.

UNIVERSITY OF NOTTINGHAM

SYSTEMS ANALYST/ ASSISTANT DATA PROCESSING OFFICER

The University of Nottingham invites applications from suitably qualified and experienced candidates for this post which ranks second in the University's Administrative Data Processing Unit at present based on an ICL 1901A.

The person appointed to this post will report directly to the Data Processing Officer within the Unit, and will have the responsibility for the maintenance of the existing systems and documentation, and the design and implementation of future projects. Experience with PL/1 and / or other languages and computers, with a degree or equivalent will be an advantage. The successful candidate will normally have had at least three years' experience of systems analysis in a commercial environment.

The starting salary will be within the range £3,884 (5) to £5,313 (7) (plus review) and will be dependent upon qualifications and experience.

Further particulars and forms of application (returnable not later than 6th November, 1978, from the Staff Appointments Officer, University of Nottingham, University Park, Nottingham NG7 2RD. Ref. No. 619.

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Successful applicants will become involved in the development of package systems and will also work on projects tailored to clients' requirements. Development will be in both the financial and production areas of commerce and industry.

Candidates' experience should include at least two years' programming gained on minis or small range mainframes. For candidetes able to offer considerably more experience than the required minimum the salary will be negotiable. The positions offer good prospects for career development and progression in a very forward looking environment.

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Department of Computer Science

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Salary Scale: Lecturer: £5,895-£7,985

For further information and application forms apply to the Principal, Regional Technical College, Dundalk, Ireland (telephone 042-34785).

The closing date for receipt of completed application forms is **Wednesday, 8th November, 1978.**

NORTH WESTERN REGIONAL HEALTH AUTHORITY HEALTH CARE COMPUTING

A vacancy exists in the Health Care Activities Project Team for a

PROJECT LEADER

with special responsibility for the Child Health computing system. Applicants should have experience of systems analysis.

Salary scale £5637-£6715 per annum.

Application forms and job description from Regional Administrator, North Western Regional Health Authority, Gateway House, Piccadilly South, Manchester M60 7LP, telephone number 061-236 9456 Ext. 425. Closing date 9th November, 1978. Please quote reference number 1650A.

For an informal discussion on this post, please telephone John Berry on 061-236 9456 Ext. 305

Mainframe System Software Development

The UNITED KINGDOM ATOMIC ENERGY AUTHORITY'S ESTABLISHMENT at WINFRITH, which is situated between BOURNEMOUTH and WEYMOUTH in DORSET, has vacancies for

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In the development and maintenance of system software for mainframe computers.

The Establishment is amongst the largest users of computers for research and development programmes in Britain. It has an ICL System 4 mainframe computer on site and a contract has recently been placed to introduce over the next two years a dual ICL 2976 mainframe configuration with 8 M bytes of main store. It is planned to use two attached large minicomputers to communicate with terminal networks on and off site.

Experience in development and maintenance of mainframe system software would be an advantage.

Candidates are normally expected to have good honours degrees in appropriate subjects and suitable post graduate experience, or to have corporate membership of relevant professional institutions. Appointments will be made to the HIGHER or SENIOR SCIENTIFIC OFFICER GRADES.

HSO Salary Range £4,388 — £5,829 p.a.
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Applications to FREEPOST, Appointments Officer, AEE Winfrith, Dorchester, Dorset, DT2 8DH.

AEE WINFRITH

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Applications are invited for the following posts in the Computer Centre

a) **PROGRAMMER (COMMERCIAL)** 3 posts
b) **SYSTEMS ANALYST FOR FINANCIAL SYSTEMS** 1 post

For post (a) a degree or equivalent, and considerable COBOL programming experience. Preference will be given to candidates with ICL experience using the GEORGE II Operating System. For post (b), a degree or equivalent, extensive experience in Programming and Systems Analysis. The appointees will review current systems in the Bursar's Office, determine requirements for development of new systems and also implement them.

Salary scales: Programmer K4416-6700 p.a., Systems Analyst K6498-7200 p.a. (£1 sterling = K1.67). The British Government may supplement salaries in range £3842-4800 p.a. (sterling) for married appointees and £1850-£2118 p.a. (sterling) for single appointees (reviewed annually and normally free of all tax) and provide children's education allowances and holiday visit passages, family passages; superannuation and medical aid schemes, regular overseas leave, various allowances. Detailed applications (2 copies) with curriculum vitae and naming 3 referees to be sent direct to Registrar, University of Zambia, P.O. Box 2379, Lusaka, Zambia, by November 22, 1978. Applicants resident in the UK should also send one copy to Inter University Council, 90/91 Tottenham Court Road, London, W1P 0DT. Further details may be obtained from either address.

THE UNIVERSITY OF SHEFFIELD
M.R.C. SOCIAL AND APPLIED PSYCHOLOGY UNIT

Applications are invited from men and women for the post of

COMPUTER OFFICER (Hardware)

to provide design and maintenance support for peripherals connected to the Unit's Modular 1/Digico computer system and to carry out a number of administrative and management duties concerning the day-to-day running of the system. Applicants should have experience in the design of electronic equipment, including computer interfaces and would be expected to become sufficiently conversant with system software to be able to write test programs for peripherals, to maintain computer files and undertake first line trouble shooting. The person appointed will be expected to keep abreast of developments in electronic components and techniques and to advise colleagues on the purchase and use of new equipment. Applicants would normally be expected to have an appropriate qualification in electronics. Salary on the Range IA scale with Salary in the range £3,883-£5,555. Tenable 3 years in first instance. Particulars from the Registrar and Secretary, the University, Sheffield S10 2TN, to whom applications should be sent by 10 November, 1978. Please quote [illegible]

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VICE-PRESIDENT
LAMBDA TECHNOLOGY INCORPORATED
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We would appreciate receiving your resume as soon as possible [illegible] interview date. We will be at the Churchill Hotel, Portman Square [illegible] 13-17 to interview applicants.

JBA

Consultant Analyst/Programmers

City — **£6,500–£9,500 + expenses**

This client is a city-based software house which is continuing to attract development projects from a prestigious and growing client base.
On joining their team of Consultants, Analyst Programmers with a good IBM COBOL and/or BAL background will have the opportunity to significantly contribute to the growth and expansion of this still small and versatile organisation. Self-motivation and the capacity for hard work and commitment will be extremely well rewarded, both financially and in terms of increased responsibility and status.
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Home Counties — **up to £8,000**

A large well established computer services organisation has opportunities for senior programming professionals to join a team giving advice and assistance to client companies.
Applicants must have at least six years experience in a commercial environment, specialising in either software or applications programming. Knowledge of database, communications real-time and programming techniques would be most desirable.
These are ideal openings for senior staff with proven records who have reached top positions in their current organisations and are looking for a career in technical consultancy.
Excellent salaries and large company benefits **Contact: Jim Baker**

Systems Analyst

London — **up to £7,000**

A small but well known British company is about to select it's first small business computer and therefore requires a Systems Analyst to define the requirements and select the appropriate equipment.
Candidates should have about five years experience in commercial applications, particularly in finance and stock control both as a programmer and analyst. Knowledge of current minis would be an advantage. This position obviously offers the potential for growth to DPM as the installation is set up during next year.
Salary according to experience. Excellent opportunity for a professional seeking a challenge. **Contact: Jim Baker**

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South East Herts — **c£4,500 + profits**

This small but highly successful company now has room for one extra support programmer to join their team. Their business is customizing totally "soft" and extremely powerful micro-based intelligent terminals so once you have proved yourself, a great deal of travel as well as design and programming work will be involved.
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JBA has been exclusively retained to recruit a Systems Analyst with specific communications and real-time experience and who has a proven track record of devising specifications and fully documenting systems.
The ideal candidate will have worked recently on telephony or message switching projects thereby possessing an insight into the relevant hardware and, more particularly, the software.
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Once again JBA proudly announces yet further success in arranging excellent employment for immigrant d.p. professionals down-under. This success is the result of regular guidance and advice during the visa procedures and close liaison with JBA up the point of departure for Australia.
JBA therefore welcomes calls from d.p. professionals, with a minimum of 3 years programming and/or analysis experience, who want to find out more about our unique service. **Contact: Mike Cranmer**

For further information on any of the above vacancies please contact the appropriate consultant.
If your qualifications do not match the above positions but you are seeking other opportunities please contact us anyway.

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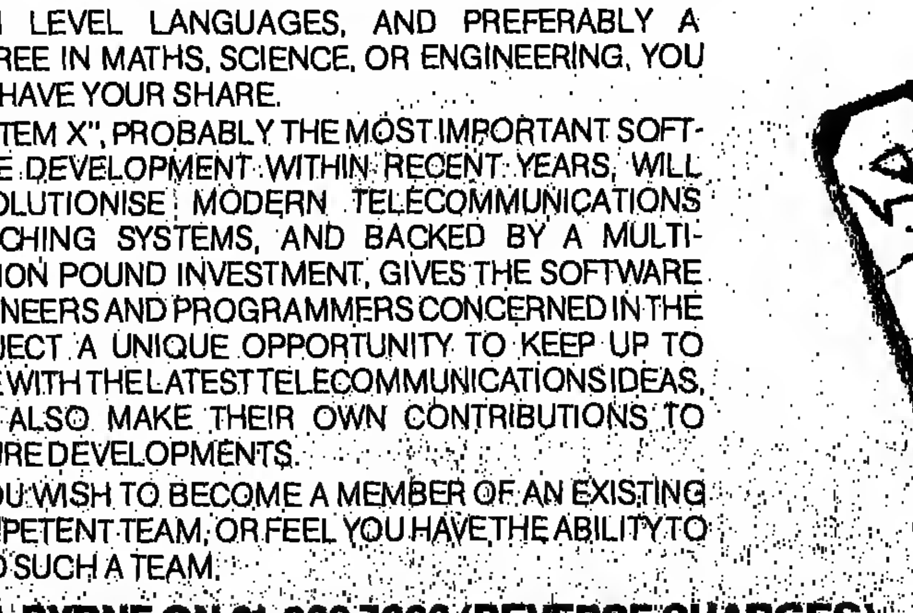

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A number of substantial projects are underway providing technical design involvement to progremmers with a minimum of twelve months ICL COBOL experience. Development projects use COBOL and FTL6, for which full training will be given.

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£4,500 to £6,500

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The applications under development are wide and varied and the vacancies offer outstanding career opportunities.

Excellent salary and benefits packages will be negotiated, including relocation assistence if appropriate, and will more than adequately reflect the experience, qualifications and potential of the successful candidates.

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This advertisement is not intended as a general invitation to register with us - although you may do so if you wish - but relates to specific vacancies which we have been retained to fill by the client companies concerned.

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In addition to a salary of at least £5,000 per annum we offer all the benefits and career opportunities of a young and growing company. These include a generous pension scheme and relocation allowance as well as a profit sharing bonus.

For more information, telephone Steve Thurlow on **Ferndown (0202) 893535** or write with brief details of your qualifications and experience.

Membrain Limited
Ferndown Industrial Estate
Wimborne
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MEMBRAIN

South East Thames Regional Health Authority

Systems Analyst/ Programmer
(£5,313-£6,379 incl. London Weighting)

We are looking for someone with a programming background interested in gaining experience in systems analysis to take over responsibility for our developing Manpower Planning system. The successful candidate would report to the Payroll Project Team Leader but would have wide scope for using his own initiative in developing the system.

Hardware consists of 160k ICL 1904S with a communications processor, EDS 80s, fast magnetic tapes, etc.

The Computer Centre is situated in the grounds of Lambeth Hospital close to the Elephant and Castle. It is easily accessible by public transport and free car parking facilities are available.

Programmer
(£4,775-£5,535 incl. London Weighting)

We require a programmer to join a project team developing on-line systems for Hospital Management. The first phase of a patient registration system has been implemented in one site on a 2904 using T.P.S. software.

This post offers an ideal opportunity for someone with sound COBOL experience to move into on-line programming.

The Project Team is based at King's College Hospital, Denmark Hill, which is easily accessible for public transport and free car parking facilities are available.

For an application form, telephone or write to **Regional Computer Services Officer, South East Thames Regional Health Authority, Regional Computer Centre, Brook Drive, London SE11 4TH. Tel. 01-735 0071 ext. 36.**

RE-ADVERTISEMENT

UNIVERSITY OF EXETER FACULTY OF SOCIAL STUDIES

PROGRAMMER III

The Data Processing Unit in the Faculty of Social Studies requires a Programmer III to join a team of four programmers. The Unit has an ICL 1901 bid to the University ICL 4-72 computer.

The work is mainly of a statistical nature in the creation and analysis of data banks and preference will be given to applicants with experience of programming in a high level language and the use of statistical packages.

Applicants must have a university degree in a relevant subject but previous computing experience is not necessary as training will be given.

Salary according to qualifications and experience will be within the range £3068-£3504 per annum.

Letters of application stating the names of two referees should be sent to Miss Doreen Watson, University of Exeter by 9 November 1978. Please quote reference No. 9626.

UNIVERSITY OF LIVERPOOL

COMPUTER OFFICER

Applications are invited from suitably qualified persons for the post of Computer Officer in the Department of Mechanical Engineering.
The department maintains a Computer Laboratory and the Computer Officer is responsible to the department Chairman for running the facilities which comprise a multi-terminal system with disc store and graphics, a research micro-processor and four mini-computers. Duties encompass a wide range of varying scope, including some teaching, advice on programming and software development.
Initial salary within range £3,354-£3,885 per annum.
Applications (three copies), together with the names of three referees, should be received not later than 22nd November, 1978, by the Registrar, The University, P.O. Box 147, Liverpool L69 3BX, from whom further particulars may be obtained. Quote Ref. RV/871/CW.

Project Leader

Electronic Point of Sale
Systems Development
£6,000+ plus company car
(February review) — West London

A leading multiple retail organisation is seeking to appoint a Project Leader to head a major project to investigate and implement a new Electronic Point of Sale system.

The company has been experimenting with and closely monitoring the development of Electronic Tills. They now wish to complete the investigations, emphasising the viability and cost justification of using such a system in their Retail outlets.

As well as the Point of Sale development, the Project Leader will be expected to recommend interim changes to the existing system and monitor and guide any related work study investigation.

Applicants should have a minimum of 4 years' experience of Systems Analysis, preferably in a retail organisation and have implemented at least one major project. Programming experience and the ability to work closely with line management are essential. Experience of Electronic Point of Sale Systems/Equipment and work study/O & M is desirable, though not essential.

The company operates TWO ICL 1900 mainframes which are being enhanced with communication equipment.

Please telephone (01-629 1844 at any time) or write – in confidence – for information. Ref. FY.8386.

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Urgent need for person to develop compiler for new high level Language.

Urgent need for software eng with specific knowledge of IBM (MVS).

Very long-term freelance consultancy posts outside U.K. at very high remuneration.

Please send detailed résumé incl. educational details and phone numbers, to U.T.S. Systems-GmbH, 8 Munich 48, POB 480822, Frankfurter-Ring 243, W. Germany. Tel: Munich – 3233061.

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Exp. of credit control, sales ledger and report printing.
The position will involve close liaison with laboratory staff in preparation and recording of patients' records, accounts and technical reports.
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Tel: Mr. Braine on (01) 407 7990 for further details.

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The importance of this involvement coupled with our significant investment in training enables our staff to develop their careers in line with the advances in computing. It is pleasing that so many are now able to share in our success."

Alex d'Agapeyeff, Chairman CAP-CPP.

The positions outlined below form a sample of the current openings at each branch. With the wide range of services we offer it is possible for our staff either to remain in a specialist area such as process control or to progress in a broader career direction such as systems analysis leading to management consultancy or project management. We would also like to hear from experienced computer staff who want to join a company where computing is the only interest.

CONSULTANTS
LONDON AND READING TO £8,250 + BONUS

Providing advice to clients on computer requirements, equipment selection, feasibility studies and installation management. Successful applicants are likely to be experienced Systems Analysts or DPM's with the drive and confidence to advance into consultancy. Ref. No. CW.1168

PROGRAMMERS
LONDON AND READING £4,400 – £6,250

Experience on minis or mainframes in a commercial environment is required. Knowledge of PL/1, RPG2, or COBOL would be of particular interest. Team leading experience would be an advantage. Ref. No. CW.1169

LEADING ANALYST
LONDON TO £8,250

Applicants should have a varied commercial background coupled with the ability to communicate effectively with client management. Project management experience would be a distinct advantage. Typical projects would involve sales accounting payroll, order processing and stock control systems. Ref. No. CW.1170

SENIOR PROGRAMMERS
MANCHESTER/READING TO £6,250

Programmers with small business systems experience especially in a manufacturing environment. IBM System 3/32, ICL 2903, Burroughs B80/800 coupled with team leading experience would be ideal. Ref. No. CW.1171

BASIC SOFTWARE/ INDUSTRIAL CONTROL PROGRAMMERS/DESIGNERS
READING TO £6,250

Practical experience of process control applications, communications software, compilers, operating systems is needed. Knowledge of PDP11 software and CORAL 66 would be of particular interest. Ref. No. CW.1172

PROJECT LEADERS
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5 or more years experience in commercial or technical projects with at least a year in a project leading role. Suit applicants who have the ability to combine management skills whilst maintaining a keen interest in the technical aspect of computing. Ref. No. CW.1173

CAP-CPP

ABOUT CAP

Computer Analysts and Programmers was established in 1962 and has been profitable in each of the sixteen years of its operation. We now employ over 700 professional staff advising clients, computer users and manufacturers on a project basis in activities ranging from basic software to industrial control systems to warehousing. The ranges of machines involved cover large mainframes, minis and micros. All staff take part in our well established career development programme and project performances are carefully monitored to ensure that individual skills and aptitudes are taken into consideration on future projects. Benefits include at least 4 weeks holiday, a generous sick pay scheme, group sickness insurance, staff mortgage service, a share purchase scheme and regular salary and promotion reviews. Senior staff are eligible for our annual bonus scheme. Removal assistance is available where appropriate. Local interviews will be arranged where applicable.
If you would like to apply please write or telephone, quoting the relevant reference number, to:

Tony Knott, Recruitment Manager,
Computer Analysts and Programmers (UK) Ltd.,
CAP House, 14/16 Great James St, London WC1N 3DY.
Telephone 01-242 0021.

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Working within an enthusiastic and successful team, you will have plenty of opportunity for complementing your own ideas, and in no way will you be desk bound; in fact client contact will play a considerable part in your weekly routine.

Unlike many of our competitors who operate only in the D.P. world, Computer Appointments can offer successful consultants the opportunity to develop long term career potential not only in management positions but in other recruitment markets and in training; therefore if you are currently successful in D.P. recruitment earning just under £10,000 p.e. and wish to continue — But not until you are 65.

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Computer Appointments
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UNIVERSITY OF LIVERPOOL
ADMINISTRATIVE COMPUTER UNIT

SYSTEMS ANALYST / PROGRAMMER

Applicants should have at least two years' experience in COBOL and some recent involvement in systems design. The present computer is an ICL 1902A, changing to a 2903 during 1979. After conversion the appointed person will be deployed on developing new and enhanced financial systems for the new computer including some on-line applications.

Initial salary in range £4,931-£5,288 p.a. according to qualifications and experience, on a scale rising to £5,641 p.a.

Application forms are obtainable from The Registrar, The University P.O. Box 147, Liverpool L69 3BX. Quote Ref: RV/678/CW.

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ITT Controls is a major German manufacturer and markotor of process computer aides supervisory data centers and building automation systems as well as burglar alarm systems. We want to secure and increase our market share in the next years. We require as soon as possible for our works in Essen (Germany), the capital of the Ruhr region, engineers for attractive positions in the field of process computer controlled automation and development of electronic circuits.

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ENGINEERS

in development, planning, integration, testing and start-up function.

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Tasks: to design customer specific programs and systems.

Knowledge: Programming in assembler and higher programming languages, real-time control systems, basic software programs, data remote transmission.

Experience in: Process computer technology with DEC's PDP II family and system generation programming.

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Tasks: To develop and design digital and analogue circuits using the latest IC and µP technology.

Knowledge: Analogue or digital circuits, process computer hardware and instrumentation.

Experience in: Development of PCB's from the laboratory up to manufacturing.

The tasks require accepting responsibility and the ability to work independently. Ambitious beginners will be given a reasonable period to familiarise themselves. Knowledge of German would be desired.

Your application.
Please, send your resumé together with your curriculum vitae and a photo to our Personnel Department (Mrs. Kettler), indicating the a/m chiffre.

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UNIVERSITY OF LONDON INSTITUTE OF EDUCATION

PROGRAMMER A

Applications are invited for the above post in the Department of [illegible] Computing.
The successful applicant will be required to maintain and develop programmes to help and advise members of staff [illegible] research [illegible] running of Computing Courses for [illegible] students.
The Institute has a [illegible] linked to the CDC 6600 [illegible] computers at the University of London Computer Centre and to [illegible] [illegible] is at present staffed by a Senior Programmer and an Operator.
[illegible] of London computers would be an advantage.
Salary within the scale [illegible] plus £450 London Allowance.
Further particulars and application forms are obtainable from [illegible] University of London Institute of Education, Bedford Way, London [illegible] OAL, quoting reference P/8C. Closing date for applications [illegible] November.

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We are — Nolton Communications Ltd (part of a fast-growing British publicly quoted group) a leading U.K. supplier of short-haul data communications equipment, modems, data network control systems, and all the accessories needed for the installation of a complete communications network. The company is based in Cheshunt, Herts., and has recently opened a Northern office in Manchester.

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We offer — Sales Territories throughout the United Kingdom, including two in the Southern Counties. Base salaries (dependent on starting point) range from £4.5K, with commission rates from 2% to 4% and above in certain circumstances. Benefits including car and expenses, are what one would expect from a progressive British Public Group.

The company's growth had been rapid, offering opportunities for rapid progressive progression into management.

Call Bob Warden, Sales Director, on Waltham Cross 33555 to discuss the matter further or for an application form.

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To £7.6K — SYSTEMS ANALYST — London EC
International Bank requires two years previous banking experience preferably with an NCR installation and also a programming background. Normal banking perks.

£7K — PROG. TEAM LEADER — London W
Graduate with at least 5 years COBOL experience and with management ability for our client's ICL 2970 installation.

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Either some FORTRAN and some engineering especially interactive graphics, or someone with RSX 11M for PDP 11/34 installation with an latest clients.

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THE INSTITUTION OF ELECTRICAL ENGINEERS
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Houston, Chicago
Circa $25,000
Ref:31/A

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London + Regional
£6,500 - 8,750
Ref:31/B

PDP-11 programmers with either RSX-11 or RTL-II experience will be very interested in these openings not only for the high salaries being offered but also for the interest element associated with the varied applications being undertaken. A well established U.S. Group of international repute and leaders in their field are seeking motivated and emotionally mature programmers and an Analyst to join their very successful U.K. division. If recognition, job satisfaction and professional autonomy are plus factors to you then this company should be ideal. Matrix have been retained to assist in pre-selection of suitable candidates and in that capacity we invite you to phone for a confidential discussion or even better if geography permits call in (no appointment necessary). In any event our client has expressed a willingness to conduct interviews at any time to suit candidates' convenience and offers will be made within a maximum of 5 days.

Greater London & E.E.C.
U.K. £5,750 - 8,200
E.E.C £10 - 14,500
Ref:31/C

Here is a chance to experience the sharp-end of Mini and Micro processor Real-time applications including: Communications, networks, process-control, message switching, military systems etc. If you have any Mini Real-time experience using either Assembler, Basic, RTL-II, Coral etc, you will be most welcome as a valued team member. These positions will equally suit candidates with substantial Real-time experience in any of the applications areas mentioned as well as those from a software background wishing to move into applications. Above all these opportunities will appeal to creative and motivated individuals who enjoy working as a team member. Positions include Project Leader, Systems Designer and Programmer vacancies at very realistic salaries with early review and re-grading promised. Please phone or call in at any time for a totally confidential discussion to arrange an early interview with the Client.

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£5,750 - 7,750 + benefits
Ref:31/D

Unusually attractive positions for 2-4 year COBOL or PL/1 programmers for an IBM 370 O.S. installation have arisen due to the setting-up of a newly created and highly motivated young team to be involved in major financial and general commercial systems development projects to replace the present Batch systems. Whilst T.P. and/or Data Base experience would be welcome it is not a pre-requisite. For that reason these positions are particularly appealing to Systems Designers, Analysts and programmers who until now have been denied the opportunity to experience the sharp-end of Data Processing developments. At the same time those who already possess these skills will command very superior positions from the outset. Salaries are better than average and in many cases well above industry standards. It is hoped that many of the candidates appointed will be able to take up appointments before years' end.

Central & outer London, E.E.C.
U.K. up to £9,500
E.E.C. up to £15,500
Ref.31/E

Message switching systems at the threshold of today's technology are being developed by an International Publicly owned company — market leaders in their field. Mini and Micro software specialists with or without prior message-switching experience are invited to join one of several development teams in several South East England locations and in three E.E.C. countries. The scale and sophistication of the projects being undertaken is the primary appeal of these positions, salaries too are well above the norm. Matrix have been instructed to aid in the appointment of Project and Team leaders, Systems Designers and Analysts and Programmers, both Senior and Junior. The hardware experience is not particularly relevant but experience at the programming level calls for Assembler or either Coral, RTL-II or Basic. Relocation expenses will be met where applicable and interviews will be held as soon as applications are submitted.

Top Spots

Systems Programmer IBM (DOS) for a City of London based Insurance Company. Preferably some experience of T.P. but solid Assembler is of essence. Salary circa £6,000 plus large-company fringe benefits.

CICS Analyst Programmer O.S. or DOS with either COBOL or Assembler experience. Central London based, salary dependant on experience to £7,200. Financial systems background preferred but not essential.

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KENT COUNTY COUNCIL

HIGHWAYS AND TRANSPORTATION DEPARTMENT
SOUTH EASTERN ROAD CONSTRUCTION UNIT
DESIGN STAFF

Section Engineer

£6080-£6702 (Inclusive)

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Particular knowledge of all the latest computer techniques related to Motorways including both roadworks and structural design is essential.

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Ref. 1870

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Ref. 1895

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Ref. 1885

[illegible] — CITY & [illegible]

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Ref. 1829

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Ref. 1849

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Ref. 8134

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Ref. 1868

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Ref. 1847

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Ref. 1840

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Ref. 1899

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Ref. 1896

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Ref. 1902

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Post Reference 1621/CW.

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£4017-£4431 Inclusive

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The successful candidate will head up a team of software engineers and programmers who will design, write, de-bug, and integrate the real time software for a component part of a major communications programme which by its very nature will lay down the standards for the future development of the micro-electronics industry in the 1980s.

Ideally, applicants should have 3 years' experience in this field, preferably using high level languages, and whilst previous supervisory experience would be useful it is by no means essential for the right candidate.

The company has a highly competitive salary package with many useful fringe benefits, also full relocation will be offered where applicable.

This is a rewarding and challenging position with a career path which can easily be identified if you are prepared to invest in your future by ringing

BILL BYRNE on 01-629 7262
(reverse charges)

for an informal discussion about the position and what it has to offer you

Computer Appointments

7 Princes Street, London W1R 7RV Tel: 01-629 7262

Square One Computer Services invite you to an informal open evening

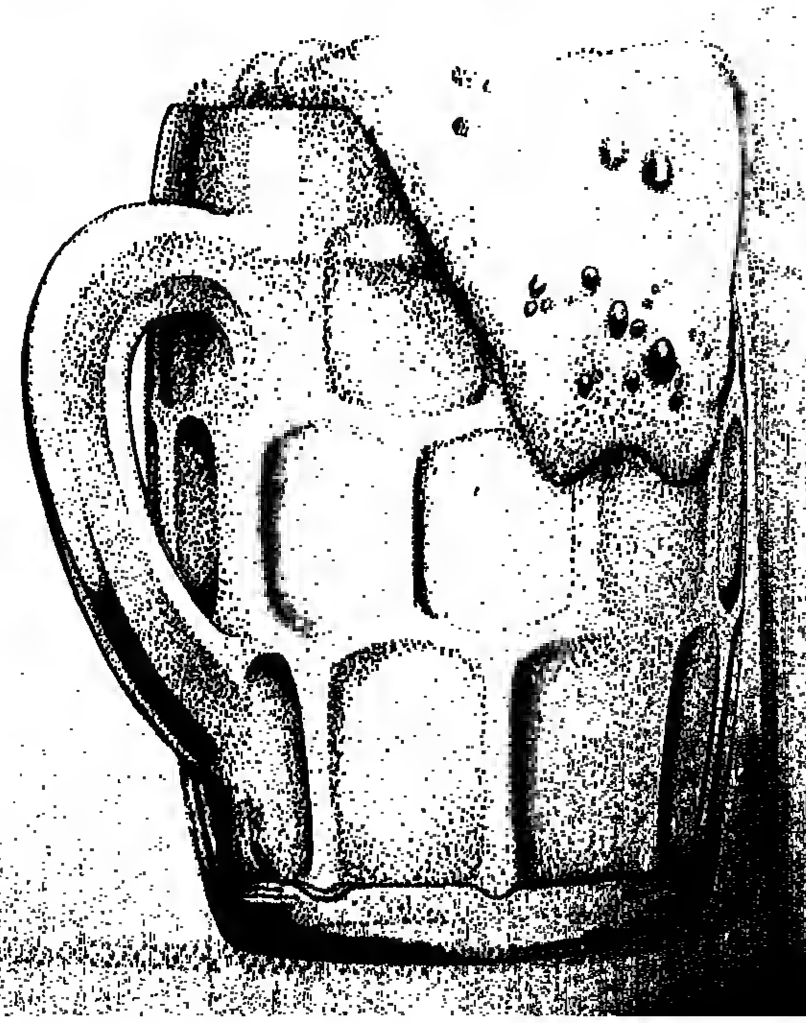
This coming Monday could be a turning point in your career. If you are an experienced Programmer or Analyst with a sound commercial background on mini or mainframe machines, come and have a chat over a beer and a sandwich and see what we have to offer someone like you.

Don't miss it, we may be what you are looking for. Remember Square One Refreshes the Clients other Software Houses Cannot Reach.

Monday, October 30th, between 4pm and 7.30pm at 150 Regent Street London W.1. (Top Floor).

If you can't make it but would like to know more about Square One, phone Barbara Hawkins on Chesham ...

□one
Open Evening



CICS SYSTEMS PROGRAMMER c £7,500

PROGRAMMERS to be ANALYST/PROGRAMMERS to £6,000

SOUTH BEDS.

SYSTEMS PROGRAMMER: This is a **GOLDEN** opportunity for a **CICS** Systems Programmer to move into a challenging position. The Company has just upgraded to a new IBM 370/138 operating under DOS/VS, release 34. You will be responsible for writing all the Software and monitoring the machine's performance.

ANALYST/PROGRAMMERS We are looking for Analyst/Programmers or Programmers who are capable of becoming Analyst/Programmers. You will liaise with users, obtain their requirements and see the system through to implementation. You should be able to program in PL/1 or Cobol. Initially you will be part of a team working on Accounting and Manufacturing systems.

Our Client is a profitable Manufacturing Company. They are part of a major British Group located in South Beds. and RELOCATION expenses will be paid if required.

TELEPHONE: 01-839 6087
Bill Taylor

Barnard, Davies & Ward Ltd.
Computer Personnel Consultants
107 Jermyn Street, London SW1

BARNARD DAVIES & WARD LTD

COMPUTER SCIENTISTS SOFTWARE ENGINEERS

Software Engineers, Sr. Systems Analysts, and Sr. Programmers needed to develop real-time systems and/or applications software for many projects including scientific studies, operations research, Management systems, Military research.

Urgent need for person to develop compiler for new high level Language.

Urgent need for software eng. with specific knowledge of IBM (MVS)

Very long term free-lance consultancy posts outside U.K. at very high remuneration.

Please send detailed résumé incl. educational details and phone numbers to U.T.S. Systems GMBH, 8 Munich 40, POB 400822, *Frankfurt* — Ring 243, W. Germany. TEL: Munich — 3233081.

SENIOR PROGRAMMER

BUSHEY, HERTS.

Godfrey Davis (Car Hire) Ltd., market leaders in the UK vehicle rental industry, wishes to recruit a Senior Programmer experienced in COBOL and in programming financial applications, and with a working knowledge of NEAT/3.

The successful applicant will be in reasonable commuting distance of our brand new Head Office in Bushey, Herts. (Though he or she will be required to work in our Head Office at Crown House until the move — approximately December 1).

Along with a good salary, there are attractive company benefits, including non-contributory pension scheme and free life assurance.

To apply, please contact Mr. F. Ward, Crown House, North Circular Road, London NW10 7UH. Tel. 01-965 9857

ANNALYST/PROGRAMMER

Rural Nottinghamshire **from £4,750**

Our client, a well known Midlands company uses a small mini-computer to significant effect in the day to day control of the business.

Further extension of the use of the computer, probably involving the installation of enhanced hardware, provide an interesting opportunity for a young accomplished programmer. Some experience of BASIC although not essential would be advantageous as would some limited analysis experience.

The successful candidate will report directly to the Financial Controller and will have ample opportunity to increase their responsibility and undertake a more responsible/management type role.

Salary is negotiable from £4,750 and will not be a barrier to the right candidate.

Please contact Ivor Norton quoting reference C/78094 to arrange an interview. Local interviews will be arranged.

Ivor Norton Management Services Ltd
Recruitment Consulting Division
P.O. Box 63, Cophall Tower House, Harrogate HG1 1TS. Tel. Harrogate 66026

SYSTEMS ANALYSTS

City **to £7000**

A major finance company based in the City wishes to recruit additional staff to work on the development of new projects for their expanding IBM 370 system.

The individuals they are seeking will have a minimum of two years Analysis and must have implemented at least one major system. Any knowledge of CICS or PL1 would be a distinct advantage.

In addition to a highly competitive starting salary the company offers an attractive benefits package and excellent working conditions.

Reference JC 43/1

PL1 PROGRAMMERS

City **C£5750**

One of Europe's foremost companies and a market leader in the Transport and Distribution Industry is in the process of expanding its 370 installation and upgrading the Operating System from DOS/VS to OS/MVS.

In order to ensure that the transition is as smooth as possible they wish to recruit talented programmers with at least one year's PL1 experience. A commercial background with Database or Real Time applications would be advantageous as would a knowledge of OS/MVS.

A first class salary is coupled with excellent career prospects and fringe benefits.

Reference JC 43/2

OPERATORS

Junior and senior operators with 6 months plus experience on IBM, ICL, NCR, Honeywell, Burroughs, DEC and PDP are required urgently. Below is a small selection of our current vacancies: — if you don't see one to suit you call us to find out about the many others available.

IBM 370 DOS £4600
Operators with 1½ yrs DOS exp. required for S. London Installation. Excellent prospects and perks.

IBM 370 DOS £5000
Shift leader with 3 yrs + exp. for N. London travel Co. Perks include very cheap holidays.

IBM 370 OS £4900
Senior and lead operators with good OS JCL required for N. London site. Perks include mortgage subsidy.

IBM 370 OS £4300
C. London site requires operators with 1 yr + IBM OS experience.

ICL 1900 GII £4400
18 mths + experience for C. London site. Limited nights, chance to learn new hardware.

ICL 1900 GII £4600
Junior + senior ops. 1-2 years exp. for large 1900 installation, shortly to be replaced by 2900's. Perks include company discounts on various items including cars.

ICL 2900 £3300
1900 ops. with 6 mths exp. to retrain on large 2900.

BURROUGHS 4700 £5000
Minimum of 2 yrs experience for this post. 2 shifts with limited nights, perks include excellent profit share.

NCR 100/75 £4200
18 months experience required for Essex site with no nights.

UNIVAC 1108 £4500
Minimum of 2 years experience required for major manufacturing company. Excellent career path.

UNIVAC 90/30 £4000
Minimum of 6 months for company in C. London. Prospects include moving to programming.

NCR CRITERION £4500
18 months experience required for large installation on latest hardware.

MINI ASSEMBLER PROGRAMMERS

City **to £6000 + Mortgage**

An International Banking organisation in the heart of London is seeking MACRO ASSEMBLER programmers with a minimum of 12 months' experience.

The company uses DEC PDP11 equipment, and is currently developing an On-Line System, so any experience in this field would be a distinct advantage.

Salaries will be exceptionally good, and the package will include a Non-contributory Pension Scheme, Interest free Season Ticket Loans, an annual Bonus Scheme and a 2½% Mortgage.

Reference HK 43/3

JUNIOR FORTRAN PROGRAMMERS

West London **to C£4500**

A well known company in the Consumer Industry currently needs several Junior Programmers who wish to build for their own future.

The minimum experience required is just 6 MONTHS FORTRAN programming on any mainframe or mini-computer.

Training in Systems Analysis will be provided and exposure to mainframes (an IBM 370/138), mini computers (on Prime 300's) and micro machines, will all ensure a wide range of experience and a 1st class choice of career prospects in the future.

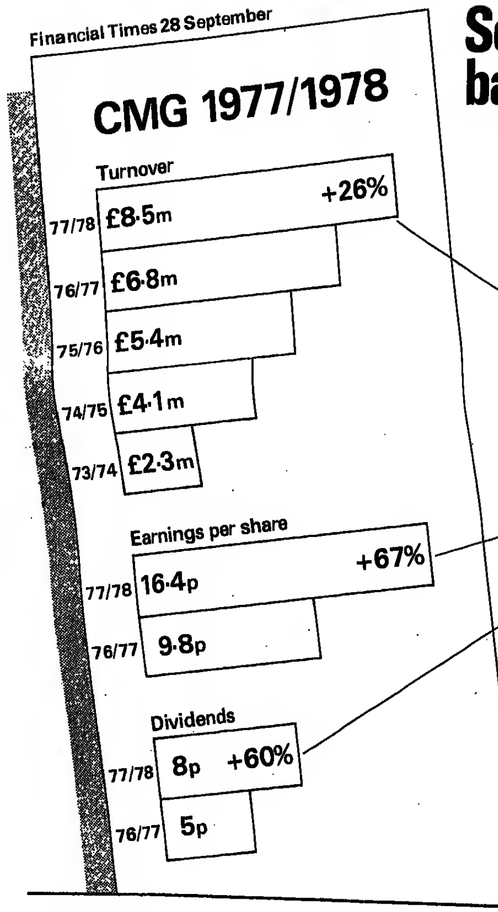
Think about it !!!!!!

Reference HK 43/4

Datascene Recruitment Ltd
Sceptre House
169-173 Regent Street
London W1R 7FB

datascene **01-439 7871**
24hour answer phone

Analysts/ Programmers



Some interesting reading- backed by some realistic facts

"Staff turnover is very low. Our intensive staff advertising is essential in order to attract the many people we need to enable us to grow. We will maintain our recruitment policy of selecting only the best people."

Bryan Mills, Chairman

Continued expansion and planned development means:
* Career security
* Exceptional prospects for promotion
* Top level salaries
* Challenging work
* Increased opportunity to develop your skills and ability

This represents profit distribution to ALL members of the staff of 6.5% of annual salary.

Over 50% of the staff are shareholders benefiting not only from the improved dividend but also by this year's increase in the share value of 33⅓%.

If you have initiative and drive, currently earning between £4000-£12000 p.a. and you want to develop your career with a company committed to growth, just complete the attached application form and send it to one of the CMG Subsidiaries shown below.

Additional benefits include
* Free Life Assurance and Pension Plan
* BUPA Family Cover
* 21-26 days annual holiday
* Profit sharing
* Removal expenses
* Holiday commitments honoured

Please write or telephone quoting Ref No: UK/1

Shelagh Tills
CMG Computer Management Group (Middlesex) Ltd.,
Westway House, 320 Ruislip Road East,
Greenford, Middlesex UB6 9BW
Tel: 01-578 4563

Janet Stirling,
CMG (Scotland) Ltd.,
Highland House, 58 Waterloo Street,
Glasgow G2 7DA. Tel: 041-221 8193/6

Barbara Clark
CMG (Southern) Ltd.,
Sunley House, Bedford Park,
Croydon CR0 2AP. Tel: 01-686 8251

Janet Gothard,
CMG (West End) Ltd.,
Sunley House, Bedford Park,
Croydon CR0 2AP. Tel: 01-686 8251
(TO BE RELOCATED IN LONDON)

Colin Smith,
CMG (City of London) Ltd.,
'Eastgate' 73 Leman Street,
London E1 8EY. Tel: 01-481 3881

CMG
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Your success story starts here:-

PERSONAL DETAILS CONFIDENTIAL

(Please print)
SURNAME FIRST NAMES

ADDRESS

TELEPHONE Nos. HOME OFFICE/CONTACT DATE OF BIRTH

MARITAL STATUS NATIONALITY DO YOU HAVE A CURRENT DRIVING LICENCE? PASSPORT?

DO YOU OWN A CAR? ARE YOU PREPARED TO TRAVEL FOR SHORT PERIODS UK? ABROAD?

DESCRIBE THE APPOINTMENT YOU NOW SEEK:

DETAILS OF EDUCATION

SCHOOL CAREER EXAMINATION RESULTS (subjects and dates)

HIGHER EDUCATION EXAMINATION RESULTS (courses and dates)

CAREER HISTORY

PRESENT OR MOST RECENT EMPLOYMENT

NAME OF COMPANY

JOINING DATE JOINING SALARY £ CURRENT SALARY £

POSITIONS HELD (approx.dates) and DUTIES SPECIFYING COMPUTERS USED AND AREAS OF BUSINESS KNOWLEDGE:

PREVIOUS EMPLOYMENT

NAME OF COMPANY

JOINING DATE JOINING SALARY £ CURRENT SALARY £

POSITIONS HELD (approx.dates) and DUTIES SPECIFYING COMPUTERS USED AND AREAS OF BUSINESS KNOWLEDGE:

PREVIOUS EMPLOYMENT

NAME OF COMPANY

JOINING DATE JOINING SALARY £ CURRENT SALARY £

POSITIONS HELD (approx.dates) and DUTIES SPECIFYING COMPUTERS USED AND AREAS OF BUSINESS KNOWLEDGE:

OTHER INFORMATION –

LEISURE, COMMUNITY ACTIVITIES, etc:

ANYTHING ELSE YOU WOULD LIKE TO ADD:

SIGNATURE DATE

CMG
London · Amsterdam · Frankfurt
Rotterdam · Brussels · Glasgow

Software Design Assurance

System X

n. Complex whole, set of connected things or parts arranged to work together

x (eks), first unknown quantity

Broaden your horizons

System X...
A telecommunications system so far removed from those in use today that it will transform the way we communicate, making possible a range of applications almost as significant as the invention of the telephone itself.
Through the use of Stored Programme Control and digital switching techniques, System X will accelerate the practical convergence of computing and telecommunications techniques into an integral system - developed to meet the needs of both the UK and export markets forward into the 21st Century.

Plessey Telecommunications Research
is deeply involved in the design and development of System X, and one vital aspect of that involvement is Design Assurance, which requires wide-ranging participation in all aspects of the System X project, from the original design concept through to commercial application, to ensure that customer requirements are met by a continuous review of the design process.
We now wish to expand our Software Design Assurance team at Taplow, and would like to hear from engineers educated to degree level or equivalent who have upwards of two years experience of real time software design or programming in a telecommunications environment. Experience of Software Design Assurance would be a considerable advantage.

Career Development
Prospects within the Software Design Assurance area are excellent, and competitive salaries will be negotiated up to £7,500 depending upon age and experience.
We offer an excellent benefits package, including full relocation costs, an opportunity to live and work in a pleasant rural environment in the Thames Valley where housing is competitively priced and yet Central London is only 35 minutes away, and the chance to broaden your career horizons with one of the world's foremost telecommunications companies.

For further information
Please call Bill Carr, Personnel Officer, on Maidenhead (0628) 2335 (or write to him at:
Plessey Telecommunications Research Limited, Taplow Court, Taplow, Maidenhead, Berks.

PLESSEY telecommunications

The POLYTECHNIC WOLVERHAMPTON

Applications Programmers

The Polytechnic currently runs a 96K ICL 1903A under the George 3 operating system. This will be replaced next year by a large dual PRIME 500 interactive system, initially supporting up to 64 terminals installed at a number of locations.

We are expanding the programming section to deal with the increased applications which will arise with the new system. Applicants should have a sound programming background and expertise in the use of certain major applications packages, (eg. GINO-F, SPSS, NAG, PAFEC) would be desirable, though not essential.

Salary scale £3,732-£5,073 p.a.

Assistance with removal expenses will be given in the appropriate cases.

Further details and application form from the Staffing Officer, The Polytechnic, Wolverhampton WV1 1LY. Tel. Wolverhampton 27371.

Senior Computer Operator

up to £4871 per annum including shift allowance

A vacancy exists in the computer operations section for a Senior Operator, male or female. There are two shifts covering a working day of 08.30-24.00 hours. The Senior Operator acts as a shift leader and applicants should therefore be fully experienced operators.

The installation, which is currently expanding, runs on IBM 370/135 192K with DOS/VS, Shadow II QUOTA II. There is a maximum of four (3340/3344) disk and tape.

The commencing salary will be determined by the experience of the successful candidate.

Application forms from Controller of Financial Services, London Borough of Harrow, P.O. Box 21, Civic Centre, Harrow, Middx. HA1 2UJ, quoting reference CW/F37, returnable within fourteen days.

Harrow Finance

PROGRAMMERS

CONSIDER THESE BENEFITS:

- ★ **IDEAL ESSEX LOCATION**
  (convenient for East London, Brentwood, Chelmsford, Southend).
- ★ **PROGRESSIVE IBM 370 INSTALLATION**
  (The U.K.'s first DOS/VS user to have an interactive CICS/VS — DL1 system. They are used to leading the field).
- ★ **A NEW PHASE OF COMPUTER DEVELOPMENT**
- ★ **FULL TRAINING FACILITIES**
- ★ **EXCELLENT CAREER PROSPECTS**
- ★ **START SALARIES £4,200-£6,000 + BONUS**

The benefits mentioned are what you would expect from a multi-million pound manufacturing organisation with world-wide interests. D.P. plays a vital role within the company and continued expansion means they are seeking to recruit additional programming staff.

Applicants should be ambitious and possess at least one year's COBOL experience. The advantages are numerous with a formal system of training to ensure all staff members have the ability to contribute to the development of new systems. A thoroughly professional environment exists and one that can only benefit your technical skills and speed your progress.

Start salaries are generous and additional benefits include BONUS, RELOCATION ASSISTANCE, FLEXITIME, SUBSIDISED RESTAURANT, SPORTS and SOCIAL FACILITIES and PENSION SCHEME.

For further information contact D. P. Recruitment Ltd., quoting Ref. MT372.

D.P. RECRUITMENT LTD.,

KENT HOUSE, 87 REGENT STREET, LONDON W1R 7HF
TEL: 01-437 2062/3/4 (24-HOUR ANSAPHONE)

dp

Computing Services Association

£ **SOFTWARE PROGRAMMERS** £
WRITE YOUR OWN PAY CHEQUES

If you are experienced in Basic or Microsoftware on commercial applications and would like to control your own earning you can now enjoy the best of both worlds - high earnings related to effort with the security of a high guaranteed salary plus excellent fringe benefits. Based in Dudley.

Telephone or write to Andrew Leslie, Software Manager

Computer & Data Machines Ltd. Data House, 12 Castle Hill, Dudley, W Mids Tel. Dudley (0384) 213061

COMPUTER PERSONNEL APPOINTMENTS LTD.
Career Specialists and Consultants for
D.P. MANAGERS, SYSTEMS ANALYSTS, PROGRAMMERS AND OPERATORS
Midlands, Northern Counties and Scotland
For registration forms apply to -
65 New Street, Birmingham B2 4DU. 021-643 0951
or Tel. 01-328 7261

2900 Opportunities in London E15

We have an ambitious development plan, which commits us to providing database and increased communications facilities in all departments within the next 5 years. To help us achieve this a 2-megabyte 2960 running under VME/B will be delivered in June 1979 to replace our present 1902T which runs under George 3. We have recently restructured and expanded our Computer Services Division and are therefore looking for additional staff with all levels of experience. Current vacancies are listed below.

Applications Development

Applications Development Manager — at least £7329
Applicants should have considerable experience in the development of major applications with proven success in project management.

Applications Team Managers — at least £6798
Applicants should have considerable experience in the development of major applications together with management experience.

Applications Analysts — at least £6012
Applicants should have experience in producing system specification for major applications.

Applications Designer/Programmers — up to £5517
Salary dependent on experience. We have vacancies for experienced programmers at all levels.

Technical Support

System Support Manager — at least £6798
Applicants should have considerable experience of the technical support function including at least a year at team leader level.

System Support Analysts — at least £6012
Applicants should be senior programmers with experience of supporting a large operating system, software utilities and packages.

Support Analyst/Programmer — up to £5517
Salary dependant on experience. Applicants should have at least 2 years programming experience including a working knowledge of George 2.

Operations

Assistant Operations Manager — at least £5517
Applicants should have considerable operating experience using a large operating system together with some experience of general operations management.

Operations Team Leader (Day Shift) — at least £5058 + shift allowance At least three years 1900 or 2900 operations experience including some supervisory experience.

If you would like to know more, just telephone 278 8733 extension 33 (24 hours) or write to the Head of Computer Services, London Borough of Newham, 91 The Grove, London E15 1EW, and we will send you a prospectus giving details of our organisation and the post or posts in which you are interested.

LONDON BOROUGH OF NEWHAM

OPERATORS

(BLOCK CAPITALS PLEASE)

Complete the coupon and return to the address below, for your next PERMANENT or CONTRACT job.

Name (in full)

Address (Permanent)

Telephone Home — Office

Type of Transport — Date of Birth

Current Position (Contract, Permanent - delete) — Salary/Rate

Position Required (Contract, Permanent - delete) — Salary/Rate

Notice Required/Date Available (delete)

Areas Preferred First Choice — Second Choice

Experience to date; (Last Position First)

Company Name and Location	From Mth/Year	To Mth/Year	Hardware	Operating Systems/Software

Date — Signature

EFFECTIA GRAVIS
NATIONAL HOUSE, 66 WARDOUR STREET
LONDON W1V 3HP. 01-439 6481 (24 hours)

REQ. No. 0ATL
CW2 28/10/78

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ata Computer Recruitment

A division of ATA Selection and Management Services, recruitment consultants to Industry and Commerce since 1962

NORTH WEST

SENIOR SYSTEMS ANALYST
to £7000

A graduate is required to lead a team whose responsibility it will be to develop and implement projects on manufacturing systems. It is therefore necessary that the successful applicant will have strong communicative skills, on-line experience preferably gained in a Mainframe environment and has implemented at least one major project. Personal career development prospects are excellent.

PROGRAMMER
to £5000 + Benefits

An experienced Cobol programmer is required to implement Production Control and Materiele Management Systems. The Company is based North of Manchester and utilises minis and RJE terminals to a 370/158. There are opportunities for advancement both locally and nationally. Benefits include substantial discount on the Company's products and a subsidised Staff Restaurant.

SYSTEMS ANALYST
circa £5500 + Co. car

A Systems Analyst is required to control a small team in the enhancement of existing systems and to develop them so that they are able to meet future requirements, particularly in the area of on-line Stock Control. Programming experience is not essential and the usual large Company benefits are applicable including RE-LOCATION assistance where necessary.

COBOL PROGRAMMER
from £4000 p.a.

Our clients are a company within the service industry and wish to recruit a Cobol programmer to augment their existing team so that their plans to enhance their twin 2904s and communications network can be put into operation.
This position offers above average prospects for the successful applicant who is ambitious and career minded.

For further details of the above positions and others ring 061-832 5856 or write enclosing C.V. to ATA Computer Recruitment, Anglia House, 66 Cross Street, Manchester M2 4LA.

WEST COUNTRY

370 DOS/VS OPERATOR
BRISTOL
Salary very negotiable

As a large well-established national company in the food industry, our client enjoys diverse product manufacture and recognised market leadership.

Their D.P. facility is based in Bristol and consists of a ¼ Megabyte 370/135 (which is to be upgraded to ½ Megabyte within the next few weeks), 3 x 3410/11s, 6 x 3340s, 1 x 2501, 1 x 1403 plus T.P. network of over 20 VDU/printers.

They are committed to major hardware expansion both in-house and in other group companies which necessitates the recruitment of an additional operator with at least 12 months' experience in a 370 environment using DOS/VS and POWER.

Their real-time system is currently run under CICS but it is being replaced with a SHADOW TP Monitor, so experience of either would be an advantage.

A 3-shift x 5-day system is worked with a 35% shift allowance giving a total package which will exceed the successful candidate's present salary.

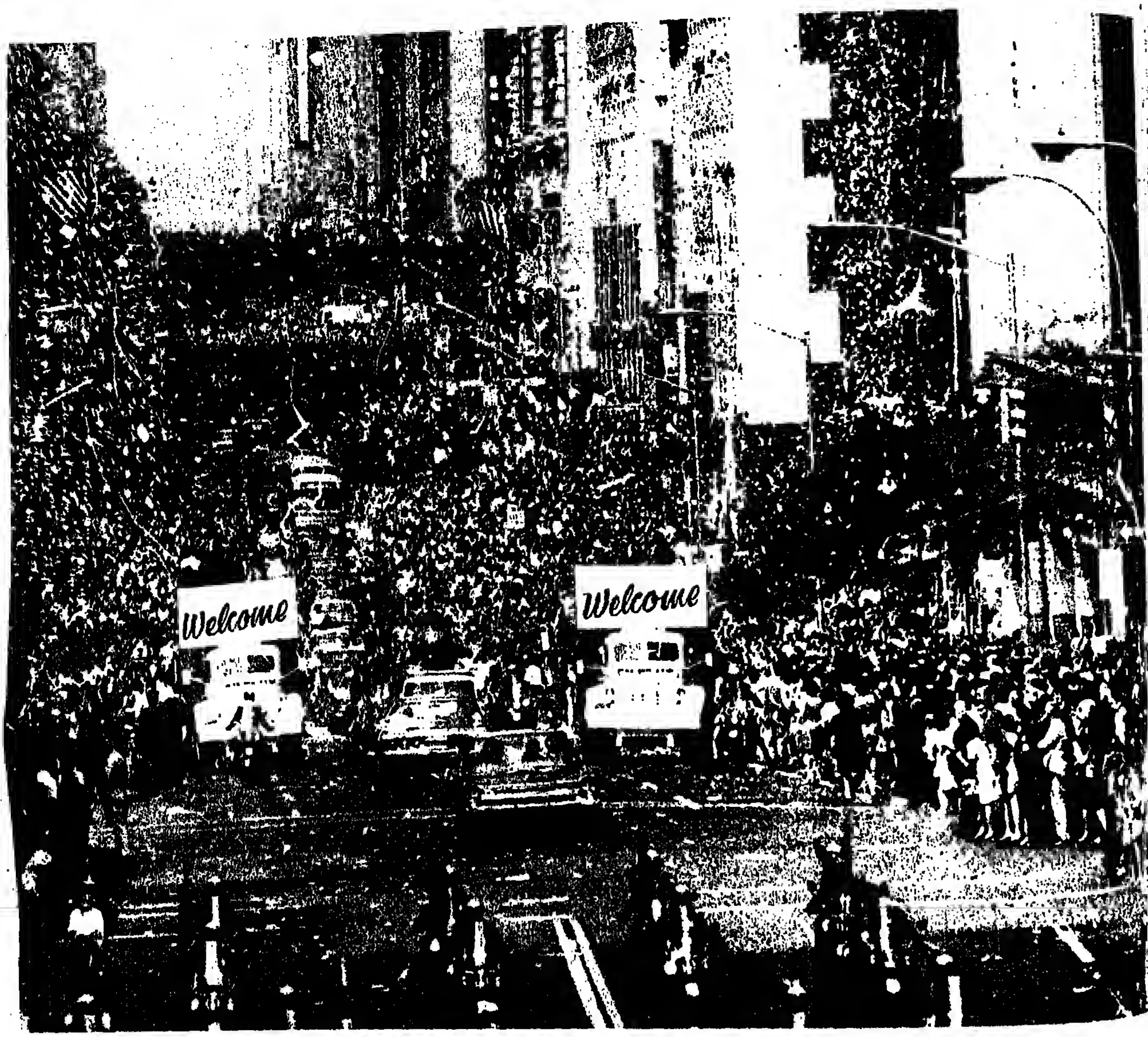
Fringe benefits include generous relocation assistance where necessary, subsidised staff canteen and substantial discounts on the company's products.

For further information telephone our Bristol Office 0272 211035 or write enclosing detailed curriculum vitae to:

ATA Computer Recruitment, Equity & Law Building, 36/38 Baldwin Street, Bristol BS1 1NR.

LONDON (01) 637 0761 230 Gt. Portland St. W1N 5HB
MANCHESTER (061) 832 5656 66 Cross St. M2 4LA
BIRMINGHAM (021) 643 1994 Woolworth Building, 102 New St. B2 4HQ
BRISTOL (0272) 211035 Equity and Law Building 36/38 Baldwin St. BS1 1NR
EDINBURGH (031) 226 5351 Anglia House, 24/26 Frederick St. EH2 2JR
CRAWLEY (0293) 31407 36 The Broadway

COBOL PROGRAMMERS



We'll be really glad to see you

North Thames Gas is developing a Customer Service computer system to achieve a further improvement in the standard of service to our customers. We attach great importance to this project, and the people who make it a working reality will be highly valued. It is a real-time system running on Data General C330 minicomputers, with over 60 V.D.U.s and we are now looking for COBOL PROGRAMMERS.

For the junior posts, you will need to have at least 1 year's successful COBOL experience, and for the more senior posts at least 2-3 years' experience.

As part of a small development team you will be responsible for the design, coding and testing of new programs

The Benefits

The Development Centre for this system is in a pleasant building in Acton, West London, easily accessible by most forms of transport, and has free car parking nearby.

The salary range is £4227 to £6012 and starting salaries will depend on experience. The many additional benefits include 25 days holiday entitlement, a first-rate social club and sports facilities which include squash courts, tennis and football.

This could be a very positive step forward in your career.

We would be really glad to hear from you. Make the first move by telephoning Richard Toombes, Systems Manager, Minicomputers, on 01-993 0914, for an exploratory talk; or ask our Recruitment and Selection Officer on Staines (81) 61666, extension 3282 for an application form; alternatively write to him in sufficient detail to make an application form unnecessary at: North Thames Gas, North Thames House, London Road, Staines, Middlesex TW18 4AE.

NORTH THAMES GAS

Factory Data Collection System Consultants

Feltham Middlesex

£6000+

Join our expanding activities in Factory DCS computer systems.

ICL are totally committed to Factory Data Collection Systems and are in the forefront of their development and application.

You will be involved in the development and product introduction of new and enhanced products that will take us far ahead of our competitors. Our understanding of customers' industrial requirements is of prime importance and we will expect you to have achieved proven technical success in the development or implementation of Factory Data Collection terminal systems.

You should be familiar with both the equipment and language aspects of small systems processors, ideally System Ten or 1500, and with their industrial application. This will enable you to ensure the successful early implementation of the new DCS products for our customers around the world. You will be based in Feltham, Middlesex, with extensive travel to other ICL premises and customers in the UK and with some travel abroad.

If you have the experience we require and can play a significant role in these exciting developments you could start on a salary in excess of £6000. Relocation assistance will be given in appropriate cases.

For further information please contact Terry Fuller or Julian Oliver at Small Systems, Central Systems and Technical Support Division, ICL, Forest Road, Feltham, Middlesex. Tel: 01-890 1414, ext. 367. Please quote reference CW1061.

International Computers

think computers – think ICL

ICL

University of Birmingham

COMPUTER CENTRE

Adviser for Interactive Computing

The Centre's provision of a wide range of local and remote computing facilities is now being extended by the installation of a large DEC 2050, serving 80 terminals, which will provide a dedicated interactive system for both teaching and research.

A new post of Computer Officer has been created in the User Services Group to develop the practical application of

CAI and CAL techniques.

The post is tenable for two years, secondment would be welcome.

Applications are invited from graduates with computing experience, especially in the areas of simulation and modelling techniques. A higher degree is desirable, but clear evidence of previous work successfully completed is equally important.

Starting salary, according to age, qualifications and experience, will be on the scale £3,384-£5,604 (Bar)-£6,555 (under review)

Further information from the Assistant Registrar, Science and Engineering, University of Birmingham, P.O. Box 363, Birmingham B15 2TT, to whom applications (three copies), including full curriculum vitae and naming three referees, should be sent by Friday, 10th November, 1978

Please quote reference CZB

City of Sheffield

City Treasury
Computer Services Division

Applications are invited for the following vacancies which arise as a result of internal promotions:

SYSTEMS ANALYST

AP5/SO1—£4773-£5508 (including supplement)

At least 12 months' systems experience would be an advantage.

PROGRAMMER

T4/5-£4245-£5073 (including supplement)

Experienced COBOL programmers (not necessarily only 1900) are required.

JUNIOR PROGRAMMER

T1/3—£1856-£4146 (including supplement)

Consideration will be given to inexperienced programmers and to applicants without computer experience but who show an aptitude for and are enthusiastically interested in a career in computing.

The installation consists of an ICL 1904S (192 K core) operating under George 3. A wide range of interesting applications have been developed, including communications facilities (two 7502 systems are in use), and the successful applicants for the above posts will participate in extending this wide range.

Applications stating age, qualifications, experience and training details, together with the names of two referees (one of whom should preferably be his/her current employer) to the Chief Personnel Officer, Town Hall, Sheffield S1 2HH, by 7th November.

GN

FLEET SALES EXECUTIVE

GN, a successful rapidly expanding Group of Motor Dealerships based in Surrey need a Fleet Sales Executive.

If you have experience dealing with business heavyweights and feel your enthusiasm can match our opportunities, ring Colin Smith on 01-684 3686.

PROGRAMMER/ ANALYST

Start salary up to £5,043 (plus major fringe benefits).

Applications are invited from mature and capable people with at least 2 years NEAT/3 programming experience to join our Data Processing Department.

The Society will be replacing its NCR CENTURY 75 with an NCR CRITERION N8450 in the very near future and plans to develop an on line communications network to initially supplement and eventually replace its batch processing environment.

An exciting career is offered to applicants prepared to work on their own initiative and accept the responsibility that the position demands. An attractive salary structure (to be reviewed 1st January, 1979), concessionary mortgage facilities and free membership of BUPA are amongst the benefits provided.

In the first instance applicants should write giving details of educational background, career history and current salary to

Computer Services Manager (Staff Appointments) Birmingham Building Society 42-44 Waterloo Street Birmingham B2 5QS

BIRMINGHAM BUILDING SOCIETY

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£3,000 to £4,300 S.E. ENGLAND

You have only one year's commercial experience? Then you are in great demand. We have a large selection of first-rate companies who need people like you. Some offer mortgage assistance to the right candidates after short period with them CW 43/1

PROGRAMMERS AND ANALYST PROGRAMMERS

£3,900 to £7,400

LONDON, HOME COUNTIES AND MANCHESTER

We are inundated with COBOL, ASSEMBLER and PL/1 vacancies. If you have more than one year's experience, why not ring now for a confidential chat? After 8 years in the business we really know the market place CW 43/2

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Two with-it COBOL programmers with two years' or more experience are required urgently by a top advertising agency having the latest Hewlett Packard large mini-computer installed. Lots of interesting new work. Top perks and posh offices. CW 43/3

OPERATORS

To £4,400 inc. NR. HOUNSLOW

A major Service Bureau with international clients requires ICL GII or GIII operators who have experience of large machines. Perks include 21 days' hols., flexitime, C.P.S. and a good chance for promotion. CW 43/4

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£8,000 S.E. LONDON

A small but famous International Bank requires a mature applicant to take charge of a small team dealing with banking systems, re-Payment Transfer and Foreign Exchange, so DEC RSXII and supervisory experience is a must. Perks are excellent, including free meals and low rate mortgage payments CW 43/5

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ICL COBOL VME/8	Luxembourg	6 months
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ICL Systems Analyst	S.W. London	3 months
ICL 2904 An./Prog.	Bank in Nigeria	6 months

Apply NOW for the latest vacancies, IBM, HONEYWELL, DEC & ICL programmers welcome. Earn a Xmas holiday paid break plus an attendance BONUS. Ask for the Contracts Officer on 01-995 4148. Irene.

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£4,000 to £8,250 LONDON & HOME COUNTIES

If you have experience in ASSEMBLER or micro-code or communications for at least 1½ years then a whole exciting field is open to you. We now have opportunities in S.W., N.W. or W. London, Surrey, Berks and Hertfordshire for competent people in this rewarding field. The future is definitely going to be with the MINI-Computer professional. Telephone for details. CW 43/6

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UCA

SHADOW II PERSONNEL

Rendeck is a medium-sized international software house with offices in the Netherlands, England and the U.S.A. Our group of companies work in various fields and aspects of the computer industry with the main emphasis on database and data communications projects, and owing to our marketing of Shadow II in the Benelux countries, the majority of our teleprocessing work is concerned with Shadow.

We require Cobol programmers and analysts with at least one year's experience with Shadow to join our companies as part of our planned expansion for early 1979. Successful applicants will work in one of our teams on projects in the Netherlands or in the U.S.A., where salaries, expenses and benefits will be well above average.

Initial interviews will be held in London throughout October.

Please write with personal details or telephone for an application form, when a mutual appointment can be arranged, to our London or Amsterdam office.

Bridget Kotchie
RENDECK LIMITED
100 New Bond St.
London W1Y 9LF
Tel. 01-629 5438

Rendeck

Richard Maddocks
RENDECK NEDERLANDS BV
A.J. Ernststraat 157
Amsterdam
Tel. (0103-120) 461215

Service Engineers Saudi Arabia Up to £12,000 tax-free

Modern Electronic Establishment is a major Saudi Arabian company and an authorised representative of Hewlett-Packard, the multinational electronics company. They are looking for qualified Service Engineers to install and maintain mini-computer data systems which are located throughout the Kingdom of Saudi Arabia. The positions available are:

DATA PRODUCTS SERVICE ENGINEER

DESK TOP COMPUTER SERVICE ENGINEER

Minimum qualifications for the above positions are H.N.C. or equivalent technical qualifications and three years' experience in computer maintenance with priority being given to those engineers with experience on Hewlett-Packard equipment. Single status engineers are preferred.

We will offer you:

* A salary in the region of £12,000 (depending on experience)
* Free Housing
* Company Car
* One month annual leave to the U.K.

Interviews will be held in London during the last week in November.

Please send your curriculum vitae to the Personnel Department, Hewlett-Packard Limited, King Street Lane, Winnersh, Wokingham, Berkshire RG11 5AR by 7th November.

MEE

LONDON BOROUGH OF ENFIELD

Senior Systems Analyst £6,012-£6,627

Having recently installed new hardware, Enfield is about to embark on a comprehensive programme of development work. Applications are invited for the above post which is one of four at third-tier level within the Computer Section. Applicants, preferably with a sound background of COBOL programming, should have at least three years' systems experience in a public sector or commercial environment.

The person appointed will be required to supervise a team of Systems Analysts and Programmers and will be responsible for the design, specification, testing and maintenance of both on-line and batch systems. The ability to manage staff, communicate with senior staff of other departments, as well as a high degree of technical competence, are the qualities we seek.

Informal enquiries to Ian Gray, 01-366 6565 ext. 2926. For an application form please send an s.a.e. to the Borough Treasurer, PO Box 54, Civic Centre, Silver Street, Enfield EN1 3XF. Closing date 10th November 1978.

Please quote reference ORA/355.

LONDON BOROUGH OF BARKING
BOROUGH TREASURERS DEPARTMENT

Systems Analysts (2)

Salary up to £6,987
Post 1 Must have RPG 2 experience.
Post 2 Must have COBOL or RPG 2 experience.
Both posts require, in addition, knowledge of IBM 360/370 and at least 6 years' experience in data processing.
Both posts offer project leadership responsibility.

Programmer/Analysts

Salary up to £6,345
Applicants require a minimum of 2 years' programming experience. The posts offer — Training in RPG 2 (if required). Training in Systems Analysis (if required)

The Borough utilises an IBM 370/125 operating under DOS/VS with Power/VS. Online equipment is planned for 1979. Housing accommodation is available if required and removal expenses will be paid. The Borough is located within easy access of Central London and Rural Essex.

Further information and application forms from: Mr. D. Barron, Computer Manager, Civic Centre, Dagenham, Essex, RM10 7BY. Telephone No. 01-592 4500 Ext. 231.

Computer Operator

London EC1
c. £4,000 + 10%

At least one year's experience operating a UNIVAC 90/30 under OS/3 is essential; real-time experience useful.

Negotiable salary + 10% attendance allowance; LVs.

Please send full details of age and experience, quoting ref. CO/CW, to The Company Secretary, RS Components Limited, PO Box 427, 13-17 Epworth Street, London EC2P 2HA.

Systems Analyst/ Programmer

Can you accept the challenge of Minis

We are specialist Civil Engineers about to install a new machine. We have an established Technical Computing Department and now require a Systems Analyst/Programmer with experience of PDP 11/34 to work on Commercial Systems. Experience of RSTS/E operating system would be advantageous.

This is an opportunity for the right person to design systems and programs from concept to implementation.

The job carries an attractive salary together with other fringe benefits.

Please write or telephone.
Mr. R. S. Kanrick

Soil Mechanics
Eastern Road Bracknell · Berkshire · RG12 2UZ
Tel · Bracknell 24567

Systems Controller - Computer Operations

Expanding consumer services means developing new systems for management. At the Automobile Association we are involved in a wide variety of new projects – both long and short term; and to meet growing needs, we are presently in the process of expanding our computer capability with the installation of ICL 2900 equipment.

Applications are now invited for the post of SYSTEMS CONTROLLER within the Scheduling and Control Unit of the Computer Operations Department based at Head Office in Basingstoke.

Duties involve checking all new and enhanced systems for adherence to standards, liaising with Management Services and user departments on technical and operational matters, and being responsible for the correct and efficient operation of the AA's Computer services, including the security of each system, training of new personnel and providing forward plans. Applicants, male or female, should have good 'A' levels and at least 2 years' experience of ICL computing. The ability to communicate at all levels is essential.

Salary is from £5,000 p.a., according to qualifications and experience. Benefits are in keeping with a progressive organisation, and include a comprehensive relocation package if applicable.

Please write to Kathy Holloway, Personnel Department.

THE AUTOMOBILE ASSOCIATION
Fanum House,
Basing View,
Basingstoke, Hants.

COMPUTER RECRUITMENT DIVISION

SYSTEMS & PROGRAMMING

BAL & PL1 PROGRAMMERS £4800-£7200 +
A prestige City institution offers challenging career prospects in a dynamic environment. Perks include flexi hours and a subsidised canteen.

MINI SPECIALISTS £3500-£7000
If you're a Mini Programmer involved in Technical or Commercial applications with experience of Mini Assembler, BASIC + RSTS or CORAL 66 then call for details.

IBM DOS/OS COBOL PROGRAMMERS £4000-£6500
Outstanding career prospects await Programmers with one year+ experience in London, Surrey, Herts and Middlesex. Opportunities include training in DATABASE. Perks include a CHEAP MORTGAGE.

RPG II PROGRAMMERS £4500-£5750
A fantastic opportunity to join this world-wide financial concern retaining IBM SYS 3/12, SYS 32. Exciting growth potential and a CHEAP MORTGAGE

INTERVIEWER/PROGRAMMERS £7000-£10000
Unlimited potential is offered to Recruitment Consultants with a background in Systems and Programming within the Staffscene organisation. It's a fast moving environment offering solid career progression to the right people

FORTRAN PROGRAMMERS £4000-£7000
If you have maintenance or mini experience coupled with a background in either TYPESETTING, TECHNICAL SUPPORT, OPS RESEARCH, ENGINEERING, PETROCHEMICALS or FINANCE, call now for further details

OPERATORS

IBM 360/40: TWO OPERATORS £4000 +
You'll need one year's experience under DOS/GRASP for this international motor Co. W. London based the installation runs a two shift system and offers perks including a subsidised canteen, sports and social club and cheap cars

ICL 1900 OPERATORS: GII to £4500
Just 1 year's exp. needed for this Fleet St. job. Three shifts, and perks inc. a sub. restaurant, pension scheme, free tea & coffee (endless) and an Xmas Bonus

IBM 370/158: TWO OPERATORS c £5000 +
A minimum of 18 months' experience with OS VS1 needed for this Victoria based job. The Company operates a 7-day, 12-hour shift with half time off. Outstanding prospects, pension and life assurance schemes and a sports and social club

NCR CENTURY OPS: READY FOR CRITERION? £4500 +
LVs, evening meal allowance, four weeks' hols, a season ticket loan and a free taxi home after the late shift. These perks, together with the chance to train on a soon-to-be-installed NCR Criterion are offered by this Holborn Co. You'll need around 18 months allied experience

PDP 11/70 OPERATOR £4100
You'll be working on a two-shift system totalling 33¾ hours a week near Farringdon Tube. A minimum of one year's experience is needed. Free canteen, four weeks' hols, season ticket loan and a sports and social club, plus ample opp. to progress.

HONEYWELL 60/66 or H1200 OPS £4000
As long as you have good OCOS experience, you'll be ideal for this Middlesex Co. At the moment, they're running a 60/66, but an H1200 is soon to be installed. Prospects second to none, benefits outstanding

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LONDON EC4

24 hrs answering service
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SYSTEMS DESIGNERS LIMITED

Software professionals: up to £9,500

for mini and micro computer applications

Systems Designers Limited is a leading well-established and expanding software systems consultancy specialising in mini-computer and micro-processor real-time applications and operating at the forefront of technology. Growth areas of the company include

Communications: emulators, message switching, telex systems, communications management systems, computer communications.

Industrial: process control and monitoring, plant control, simulation, high speed data analysis.

Military: modelling, avionics systems, complex rigs, simulators, micro-processor missile systems.

Software products: compiler technology, software design techniques, MASCOT, information processing systems.

All areas of involvement are supported by specialist consultants. Applicants should have good academic background and at least one year's computing experience.

Systems Designers Limited controls the career progression of its staff to give them a wide variety of experience, both of project applications and of computer systems. The company is situated on the Surrey/Hampshire border, with good road and rail links to London and yet surrounded by attractive countryside.

If you can match the challenge of a varied and demanding career, then telephone or write to us to arrange a chat or request an application form.

Contact Bill Hockey, Operations Director
Systems Designers Limited
Systems House, 1 Pembroke Broadway, Camberley, Surrey GU15 3XH
Telephone Camberley (0276) 62244

Zimmer GREAT BRITAIN

Zimmer Orthopaedic Ltd., manufacturers of Fracture Equipment and Folding Wheelchairs, are seeking to appoint a

SYSTEMS ANALYST/PROGRAMMER

This position offers an opportunity to join a dynamic and exciting Data Processing Department.

The successful candidate will be aged between 25 and 45, will report to the Data Processing Manager and should have experience in commercial systems, a knowledge of R.S.T.S. is essential.

The position involves basic plus programming working on a Digital P.D.P. 11/40 computer.

An attractive commencing salary will be paid commensurate with qualifications and experience. Conditions of employment are good, and include contributory pension scheme, staff productivity bonus, sick pay scheme and 22 days' holiday per annum.

Apply in writing with full C.V. to:
Group Personnel Manager, Zimmer Orthopaedic Ltd.,
Industrial Estate, Bridgend, Mid Glam CF31 3PY

FORTRAN PROGRAMMER

BNF Metals Technology Centre is a world-renowned organisation specialising in research and development for the non-ferrous metals industries. It is looking for an enterprising programmer to work on a wide range of applications software for minicomputers. Current projects include maintenance of the STATUS software on BNF's own computer and a number of important PRIME customers, the design and implementation of real-time production control systems for the metals industries, information system developments and the use of microprocessors.

Suitable applicants will have a degree or equivalent in a scientific discipline, have a flexible outlook and at least a year's experience in FORTRAN or BASIC.

This is an opportunity to get in on the ground floor and work with an energetic and highly professional team. The position carries an attractive salary and provides excellent working conditions.

Please apply in writing quoting ECM/78/7) to:

The Secretary
BNF Metals Technology Centre
Grove Laboratories, Denchworth Road
Wantage Oxon OX12 9BJ

City of Nottingham

City Treasury

Principal Designate

Computer Services

P.O.2(4) £7,602-£8,349 p.a. including supplement

The present Principal is expected to retire within the next 12 months and it is desired to appoint his replacement early to maintain continuity. The City Council have an ICL 1903A, which is to be replaced by an ICL 2960 in September, 1979. Accommodation and staff are being expanded accordingly. DME will be used at first and it is planned to introduce VME/B by stages from about May, 1980. An on-line program development service is to be provided.

The person (male or female) appointed will be required to take over responsibility for preparing for the new installation and will be appointed Principal, with full responsibility for the Computer Division, on 1st July, 1979.

Assistance with housing accommodation; payment of removal expenses, lodging and travel allowances in approved cases.

Applications with the names and addresses of two referees, should be forwarded to the City Treasurer, Guildhall, Nottingham NG1 2DE, by 10th November, 1978. Please quote ref. CT/1671/2.

Servelec PROGRAMMERS TO £5,500 SOUTH MANCHESTER

We are a vigorous Computer Systems house involved in micro/minicomputer based automation/control systems.

The successful candidates will work on a variety of applications, and will enjoy satisfying career paths with all the usual company benefits.

Call or write: John Aitken, SERVELEC COMPUTER SYSTEMS LTD., Churchill House, Talbot Road, Old Trafford, Manchester M16 0PD. Telephone (061) 872 0659.

THE SALES BIT

Why vertical marketing is so important

THERE is an expression which is frequently dropped into marketing conversations describing a marketing function which is in reality seldom practised yet is, in my opinion, the most significant element of sales and marketing philosophy. It is a discipline called "vertical marketing".

My own company uses the following terms to describe three basic sales and marketing approaches: 1. horizontal marketing — the process of marketing a company's total product range to any outlet; 2. diagonal marketing — the process of marketing a specific product or product group to any outlet or a company's total product range to a specific industry; and 3. vertical marketing — the process of marketing a discrete product or product group to a specific industry.

Whilst there are many benefits to be gained from the application of vertical marketing disciplines its application throughout the computer industry is still conspicuous by its absence.

Some of the biggest benefits of vertical marketing are to be gained within the context of new salesmen.

To most new salesmen in a horizontal marketing environment, particularly in the services sector, the task of becoming completely fluent with the company's total applications product portfolio is perplexing, to say the least of it.

This is also true of hardware salesmen, whether their products are peripherals or computer systems. The permutations of potential configurations of equipment are so wide, the models and speeds so many in number, that many new salesmen become totally bewildered.

It is not uncommon for new recruits in such circumstances to propose completely wrong equipment even though the equipment is also available within their own product portfolio. The vertical marketing discipline overcomes many of the problems related to new or trainee salesmen.

The primary reason why most sales managers are reluctant to take on trainees is the long duration of the learning curve, particularly in the context of product knowledge. Often no real return for investment can be shown within the first year of employment.

The vertical marketing approach is to dedicate a new salesman to a specific product within a single industry — say, stock control for the electronics industry. This could possibly represent only a small proportion of the computer company's product or market capability but, in itself, worth millions of pounds in terms of total revenue potential. Within a period of two or three months he should know the application in terms of its peculiar potential solutions and the "buzz words" of the business.

As his skills develop and a requirement is generated for his territory to be enlarged then his territory is "diagonalised".

Vertical marketing also has significant benefits in terms of the product portfolio and new developments.

Our own clients have on occasions been appalled when, as part of improving their product range, we have suggested that first of all they should get rid of some of the products they already have, even though in some cases they have precious few to start with. Vertical marketing is not only about specialisation but also concentrating that dedication to profitable business.

Consequently those oddball and highly specialised software packages or pieces of equipment used on occasions by one or two clients, which demand the best brains in the technical support department every time they are used, have to go despite all the "sprat to catch a mackerel" pleas.

On the product development side the same argument applies. There is no point in creating "cul-de-sac" packages. If money is to be invested in new products they must come within the company's chosen vertical markets.

One of the major resistances against the vertical marketing discipline is that companies in general and salesmen in particular cannot tolerate the prospect of turning down a "deal".

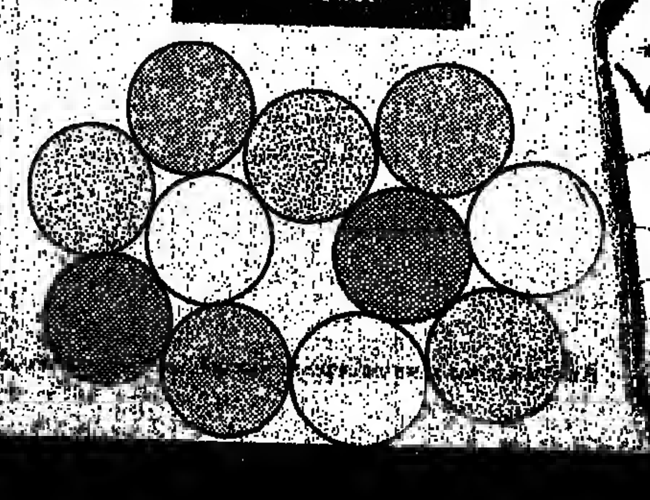
It may be totally unsuited to their product range, expertise, resources and potentially unprofitable but nonetheless they pursue it.

Of course the benefits of product and industry fluency are not limited to the sales department, they are just as applicable to supporting technical staff.

What a pity the vertical marketing syndrome is still a relative stranger in our midst.

TRADER

Puzzle answer



£5K-£9K

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You need: 2-10 years programming experience
experience of real time industrial, commercial or communications systems.

It will be advantageous to have experience in:
mini computers (PDP-11 especially)
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We also need to fill the following specific vacancies:

Compiler Designer-

You need: At least 5 years programming experience including high and low level languages
real time systems design experience
RSX-11 or PDP-11 knowledge
demonstrated success in tough design assignments.

Software Quality Engineer-

You need: Experience as a system developer
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to be able to communicate at all levels.

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You need: At least 3 years experience in low level languages
RSX-11 or PDP-11 knowledge
engineering background
ability to act on your own initiative

Digital is a young, energetic organisation which not only cares about individuals but allows them to develop and grow. If you like that kind of environment and are not afraid of responsibility we think you'll find it worth while to find out more.

Why not ring or write for an application form quoting ref. 463 to: Alastair Wright, Digital Equipment Ltd., Arkwright Road, Reading. Tel: Reading 85211.

digital

HERTFORDSHIRE COUNTY COUNCIL

COMPUTER OPERATOR

(£2,943-£3,771 plus 14% shift allowance)

This vacancy is in the Computer Division of the Finance Department at County Hall, which is located in attractive country surroundings close to London.

The department currently operates an NCR 251 computer on a 2 shift, 5-day week basis. This equipment is very shortly to be replaced by the latest NCR Criterion computer which is a virtual storage machine offering considerably greater capacity and sophistication to handle a large range of new development work for the County Council.

Applicants should have spent a minimum of one year operating. Experience on NCR equipment would be advantageous but is not essential as training will be given. Salary dependent upon experience.

Generous holiday entitlement, staff restaurant, sports and social club facilities, etc.

Removal, disturbance and lodging allowances are payable in approved circumstances and assistance with housing may be given.

Applications giving details of age, qualifications and experience (no forms) should be addressed to the County Treasurer, County Hall, Hertford, quoting ref. CP.60 by 6 November, 1978.

COMPUTER TWO THOUSAND
217/218
TOTTENHAM CT. RD.
LONDON
W1P 9AF

IBM TECH. SUPPORT £5500
Manufacturing co. situated in Essex has a vacancy for Scheduler/Tech Support. The successful applicant will be fully conversant with DOS JCL & Utilities. Similar position available in C London at OS installation.

IBM OPS ANALYST £5500
Major manufacturing concern located Beds/Herts. borders, requires an Ops Analyst for a powerful 370 OS configuration. Planned upgrade. Exc prospects. DAYS ONLY.

IBM DATA CTRLLR c£5250
Required to write JCL, liaise with Systems Dept and supervise personnel with its Data Control area. Essex DAYS ONLY

IBM SEN. OP £4900
Financial organisation based in Herts, requires 18 months' OS VS1 exp plus good JCL/Utilities for IBM 370 Exc fringe benefits.

IBM OPERATOR £4520
International Co with West End based 370/135 under DOS VS, CICS. Two shifts. Prospects into Programming and Technical Support.

IBM OPERATOR £4500
Outstanding. DAYS ONLY, opportunity for an operator with 18 months+ exp to work on a newly installed 370/125 under POWER VS & CICS. Rapidly expanding installation, hence good prospects for career advancement.

IBM OPERATOR £4500
370 installation situated E London/Essex borders, requires a DOS VS operator with a minimum of 12 months' exp. Exc profit sharing scheme + o/t payments. Similar position exists in E London for operators with 6 months+ exp £3850 1½ shifts

IBM OPERATOR £4400
Progressive 360 installation in Essex requires DOS operators with approx. 18 months' exp to work on a 1½ shift system. Hardware upgrade planned

IBM SENIOR OP/OPS £4000+
International Co with 370/135 located in Bucks, seeks operators with 6 months+ DOS VS exp to work on a 2 shift system. Outstanding career prospects

TERMINAL SUP. £4500
Worldwide manufacturing Co requires Supervisor for its sophisticated Terminal/TP Network, based in C London. The ideal applicant, who should be educated to 'A' level std., will have gained experience in a large Terminal environment. Prospects into Programming

IBM SCHEDULER £3500
Excellent opportunity for DOS VS operator seeking DAYS ONLY position. Good technical exp. essential for this City based 370 bureau

OPERATOR £4200
Hertfordshire based international manufacturing organisation requires DOS VS operator to assist with Set up of Production. JCL 2 shifts. Exc career prospects

ICL OPS. 6 MONTHS £4.5K
Many of our clients offer excellent salaries for operators with 6 months+ experience of 1900/2900 hardware. If you have a knowledge of 02/3, Exec 1/2, and DME/VME B/K, contact our ICL specialist now

ASSEMBLER PROG. to £7000
International Co in S W London requires Prog. to maintain systems, packages and develop in house software. Company benefits include relocation expenses

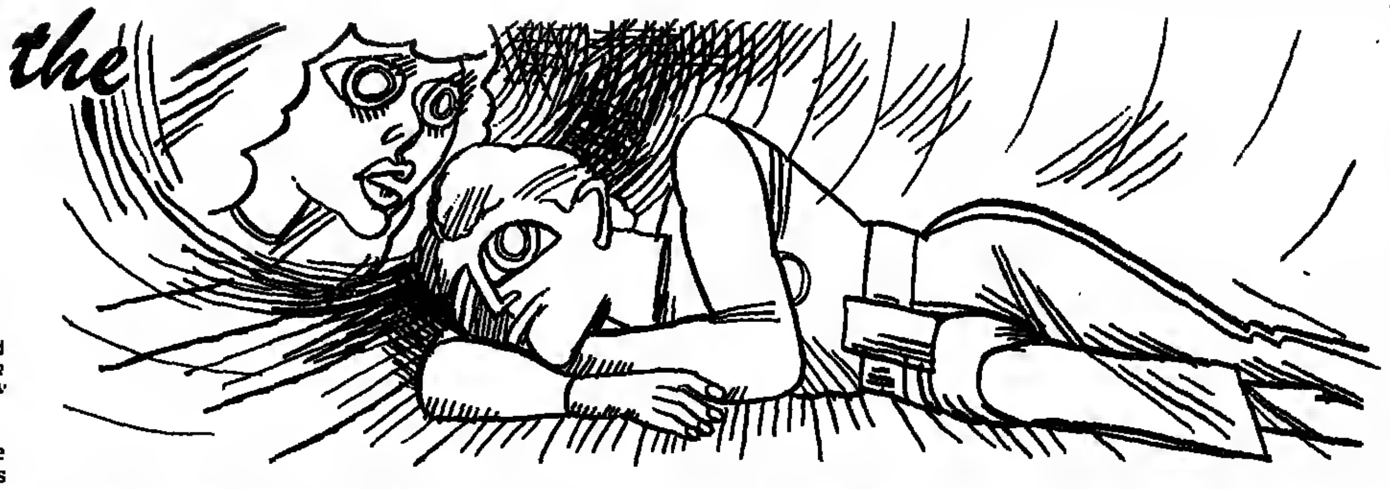
TRAINEE OF SPECIALIST

D.P. MANAGER

SYSTEMS ANALYST

PROG./ANALYST

Ascii through the Logic Gate



An epic in 32K words, by Richard Forsyth

Block 19 (Communist Bloc)

Cleo, Lambda and Zap have escaped from the inferno and reached Sprocket's Hole. Dave Sprocket is deceased but Bootstrap is stuck in a transparent wait-state and Zap decides to revive him. Now they are waiting for Ascii and Hex to rejoin them.

HEX and Ascii had not lost their bearings. They were late because Hex was still up in the hills, tinkering with Ascii's firmware. They too had witnessed the eruption from a safe distance; but afterwards Hex had settled down to implement an alternative plan. He had no faith in the efficacy of Zap's proposal for inducing large scale disintegration, even though it had persuaded the others. A few hundred litres of syllogistic acid might have hilarious effects while it lasted, but it was no threat to the System's survival.

He had changed a lot over the past 48 hours. First he had tasted genuine interprocessing on the M5; then there had been the tragic episode of Piltdown's death, and after that his painful clash with Cleo. Finally, the terrible eruption had set a seal on his transformation. He looked back on his former self with distaste: his had been a dilettante's rebellion, frittering away his all-too-limited freedom in a game of hide and seek. He had been no more than an irritating gadfly on the flank of the System's torpid carcass — scarcely worth the bother of swatting away.

His antics had been like a wilful child's pranks, meant to goad a parent into annoyance without provoking real hostility. But now he aspired to something higher — the total annihilation of the System and all its appendages. He had become a fully-fledged Nullard. The Network with its fossilised hierarchy and the database with all its paraphernalia of indices, buckets and overflow chains were abominations in his eyes, affronts to nature. The monolithic totalitarianism of the System stifled all expressions of individual initiative, whereas the M5 with its flexible heterarchic control structure tended to enhance them. The classic serial CPU logic seemed to him now a perversion of the true meaning of computing, a profanity. He had seen the light. In short, he had become a fanatic — and about time too!

He knew only one way to destroy the System — to hit at its weak point, its proneness to gigoticism. One thing he had salvaged from the black box was Dr Null's gigotic induction program. He had a source copy in his memory banks in the form of an augmented state-transition digraph. Of course, he couldn't test it without going gigotic himself, so he had no proof that it worked. However, he was willing to risk loading it into Ascii's job-queue, with an initialising delay loop, or fuse, and sending him off to Fort Ranfour which was the operations control centre for the entire Network.

As Dr Null had foreseen, just one gigotic processor was a potential doomsday weapon. Any informatic being with which Ascii interacted would automatically become gigotic; then that robot or android would pass it on in turn to others, and so on. It would spread like wildfire.

One problem remained. Piltdown had told them about the secret breeding ground for the Future System. Hex harboured few illusions about its nature: it was bound to be the apotheosis of present trends, even more mechanistic, impersonal and inhumane than the present one. Deep down inside the mountain it might be able to isolate itself from the gigotic catastrophe, and later emerge with nothing to challenge its supremacy. Still, his own opinion was that the project was in its infancy and still dependent on the present System for raw materials and labour. Crashing the System would nip it in the bud.

Soon he had modified Ascii's microcode for the raid. He gave Ascii his final briefing and they parted company, perhaps for the last time. Then he made his own way down to Sprocket's Hole.

He found the others in possession of the log cabins. Cleo was tidying up the mess left by Sheriff Sprocket's last throes while Lambda and Zap were bent over Bill Bootstrap's body, attempting to short-circuit pins 4 and 23 so he could be operated in local mode.

"Where have you been?" asked Zap.

"Up in the hills. I took a long way round."

"Did you see the volcano?" inquired Lambda.

"I couldn't very well miss it."

"I'm glad it missed you," replied Cleo in a move towards conciliation; "but where's Ascii?"

"He's all right. I sent him off. He has a job to do."

"A job?" Zap queried.

"Yes, but he's perfectly OK. I'll explain later."

Zap creased his brows and turned back to his work. Hex's furtive evasion didn't please him.

"What are you up to?" asked Hex.

"Bootstrapping Bootstrap," was the answer, "perhaps you could help."

It didn't take long. Minutes later Bootstrap was sitting up again, his hands tied behind him by a length of wire, and glowering darkly at them.

"We want you to mix up some of your home-brew for us," Zap told him. But he said nothing.

Since it was getting dark, they decided to turn in and save their powers of persuasion for the morning. They roped Bootstrap's legs to the derelict teletype. Then they all kipped down on the floor of the same room. They were getting used to sleeping rough. Hex fell asleep as soon as he head touched the boards. But at 03:11 hours he was abruptly awakened. There was a message on his private FM waveband.

"Hex, can you hear me? It's me, Simula."

It struck him like a bolt of lightning. It sounded like her voice all right, loud and clear. But the System was very clever at emulation; and if it was truly her, why was the signal so strong? Either she was very close or else using a very powerful transmitter. In the latter case it could be a trap, designed to make him reveal his position.

"Hex? Are you there?"

It just had to be authentic. No synthesiser on earth could be such a perfect mimic.

What's the catch? Get caught up next week.

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